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IN THIS ISSUE

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OPERATING ACID PLANT

INFORMATION on newer UK chemical plants, and even more relevant, operational news on these, is generally either completely lacking, or sparse. This week, however, two papers were delivered at a meeting in London (17 March) of the chemical engineering group of the Society of Chemical Industry, which gave valuable constructional and operational details on two types of sulphuric acid plant.

In 1953, a Petersen tower sulphuric acid plant was completed by Scottish Agricultural Industries Ltd.'s fertiliser works in Aberdeen. Mr. J. P. A. Macdonald, describing this plant, said that SAI's need for a new sulphuric acid plant had been met by combining flash roasting of pyrites with the Petersen tower system of acid making.

The Petersen process has been developed from the lead chamber system with the intention of obtaining a plant having lower capital cost and occupying less ground area. In fact, a modern Petersen system operates with about eight per cent of the reaction space of the air-cooled type of lead chamber. Another advantage is that the process has proved suitable where the gas feed fluctuates in respect of strength, temperature and volume. Also because it is not necessary to have extreme freedom from dust and moisture in the SO_2-bearing gases, much elaborate and expensive gas treatment equipment used for a contact plant is not required.

There are some interesting details regarding this SAI Petersen sulphuric plant. The towers, for instance, have been built in acid-resisting brick without lead sheath but a polythene barrier has been incorporated to make them impermeable. Standard bricks, of Nori acid-resisting quality, were used wherever possible, with the denitration tower having its inner brickwork formed in Metaline. Cement made from acid-resisting brick dust, ground to 75 per cent through 240 mesh, sodium silicate and ethyl acetate was used.

Fixing of the polythene membrane involved removing all sharp edges by electric-driven burr. Then two layers of polythene were applied in horizontal bands, heat sealed and spark tested.

With economics to the fore the tower filling selected was Aberdeen (Correnie) granite lump packing for one production and two nitration towers, with rings for the denitration (one) and stabilising (one) towers. In the hotter part of the denitration tower Metaline rings were chosen with the remainder in that tower of Doulton ware. In the stabilising tower the rings were of Nori material. The performance of the Correnie granite, however, has proved unsatisfactory and has been replaced by Sussex bean flint.

Because of the high initial cost of lead and the disadvantages of cast iron for coolers, Pyrex was decided upon. Operating experience has shown that the greatest amount of trouble on the plant has been caused by cooler failures. Before a first modification excessive glass breakage occurred. The modified coolers have resulted in glass breakage being almost unknown, but faults from joints have continued. The Bakelite flanges appear to stretch, presumably due to being in continuous contact with water. Fluon sleeved joints are stated to have not been too much trouble.

Although previously instrumentation was usually very limited on Petersen plants, fairly comprehensive instrumentation has been set up at the SAI plant

for the acid-making section and the flash-roaster section. Despite all this, the control of the plant, it is learned, is still dependent to some extent on the colour of the exit gases. Indeed, in order to cater for this need a continuous sample of gas has been taken to an illuminated tube in the control room.

No lack of confidence in the process nor any dissatisfaction in the choice of system is reported by Mr. Macdonald. With the overall cost of production as the criteria, it is stated that even allowing for the cost of rectification measures, the figures arrived at for the 100,000 tons of H_2SO_4 already made is lower than the estimated cost of acid produced on a pyrites contact plant or on a chamber plant. The quality of the acid produced has been entirely satisfactory for fertiliser purposes. Sulphur efficiencies in the Petersen section have ranged from 97 to 99 per cent. Nitre consumption (2 per cent on sulphur burned) has been a little higher than guaranteed owing to periods of interrupted working. Acidity of the exit gas has averaged about 0.3 grains SO_3 per cu. ft.

The combined process-labour requirement for the flash-roasting plant and the Petersen tower plant is three men per shift. Not only do these men cover normal running of the plant, but they cover handling of pyrites from store to skip, routine testing, boiler operation and disposal of acid to stock tanks.

Power consumption of the Petersen section is approximately 30kW. per ton of 100 per cent H_2SO_4.

Possible lines on which future designs may be based are always valuable. Since this SAI plant was completed, improvements have taken place in pump design generally, and it is now practicable to pump hot acid. This permits construction of towers at ground level with the possible exception of the denitration tower, thus eliminating platform construction. If continued experience is satisfactory with welded steel shells lined in acid-resisting brick, towers are likely to be constructed of this material. For the cooling section, good quality cast iron coolers, or special heat-exchanger sections are suggested for future plants with towers at ground level. The most practical proposition would be, suggests Mr. Macdonald, forced draught air-cooled coolers, although they are not economically attractive.

THE KACHKAROFF PROCESS

The choice of the chemical works of the South Eastern Gas Board at East Greenwich for a sulphuric plant fell upon a Kachkaroff plant. This plant was put into commission at the beginning of 1955 and it has now been possible for some indication of the economics of the process to be given. Spokesman for the South Eastern Gas Board was Mr. F. C. Snelling.

A modification of the lead chamber process, inasmuch as nitrous oxides are used as the means for the oxidation of SO_2, the Kachkaroff process differs in that the mass relationship between N_2O_3 and SO_2 in the system is unusually high. Advantages resulting from this is that reaction time is reduced to a minimum and retention of a relatively large mass of N_2O_3 in the system gives remarkable flexibility to the process.

The new East Greenwich plant, said Mr. Snelling, was required to use gas-works' spent oxide of varying quality as the raw material, the acid to be produced being suitable for manufacture of high-grade sulphate of ammonia. As all existing Kachkaroff plants at the time (in Italy and France) used pyrites and the acid produced was only suitable for manufacture of superphosphate, a pilot plant having a capacity of 3 tons, 77 per cent H_2SO_4 a day was therefore operated for about nine months. Conclusive evidence was obtained of the practicability of the process.

Mr. Snelling gave a detailed description of the plant, from which it is apparent that considerable use has been made of p.v.c. Thus the tower tops have been fabricated in p.v.c.; the acid irrigation system is constructed entirely of p.v.c., while the gas connections are steel tubes lined with p.v.c. Gas connections between the towers are fabricated from 3mm. p.v.c. sheet; these are supported internally in the case of suction mains by a p.v.c. covered steel framework. Tanks designed to hold 100 tons acid for the reaction tower circulation system, are of welded steel lined with p.v.c. The sump tank has been lined with acid-resisting bricks with a p.v.c. membrane.

Since the plant was commissioned Mr. Snelling reports, it has continued to operate 'with almost complete success.' It has produced almost 60,000 tons of acid at a comparatively low cost, while long-term repairs and renewal costs will be much less than those of a lead chamber plant. Difficulties experienced in the first few months were almost entirely associated with the failure of the glass cooler. When first tested leaks were discovered and breakages occurred later. Because of the frequent shut-downs, two of the three tanks of glass coolers were replaced by cast iron. Success of a glass cooler depends, it seems, on dimensionally accurate elements, the use of sufficiently resilient joint rings to absorb strains due to temperature changes and any mal-alignment of the tubes.

The cooler failure subjected the towers to severe temperature fluctuations but despite this, cracking of the tower walls did not occur. Even the p.v.c. tower tops although subjected to high temperatures, are reported as having given very satisfactory service.

PRODUCTION COSTS COMPARED

As the Kachkaroff plant has been operated side by side with a box chamber plant of similar capacity a detailed comparison of production costs has been possible. Power costs have been higher on this plant, but costs of labour, ammonia, repairs and maintenance have been considerably lower, so that the net result is that the total production costs (excluding capital charges) for the new plant have been found to be 15 per cent lower than the chamber process. These costs could be still further reduced in a plant of larger capacity which could easily be operated, it is claimed, by the same labour force—namely two men. (One is responsible for process control and routine chemical testing and the other collects samples and is responsible for simple maintenance).

Output of the plant is mainly governed by the quality of spent oxide burned and capacity of the burner installation. Snelling mentions that the output could be raised considerably using spent oxide of high sulphur content and minimum organic matter, or, with additional burner capacity.

Important features of the process are its flexibility and simplicity of control, and these advantages have evidently been well demonstrated over the past three years. Acidity of the exit gases, another important feature having regard to pollution of air problems, has compared favourably with that of the box chamber plant using spent oxide but the 'mist' content is described as higher with consequently, greater difficulty in dispersing the gas. Ceramic filter experiments are recorded as producing encouraging results and it is believed that by such means, the 'mist' will be reduced to negligible amounts or eliminated altogether.

Improved methods are already forseen, Mr. Snelling reports. Erection costs can be reduced by increasing the use of p.v.c. and the use of fibre glass and other lightweight materials. Production costs might also be lowered by increasing the contact surface in the reaction vessels and decreasing their height, so reducing the total power demand.

INDUSTRY OPERATING BETWEEN 80-90 PER CENT OF CAPACITY

Sir W. Worboys Opens OCCA Exhibition

THE British industry had returned, or was returning, to the pre-war general state of affairs when it was common to work plant between 80 and 90 per cent of capacity. That was not a disastrous condition, but it did pose problems for management and it was setting the salesman free to do his job of selling.

That view was expressed by Sir Walter Worboys, president of the Association of British Chemical Manufacturers, speaking at the luncheon held in conjunction with the tenth OCCA Technical Exhibition on Tuesday this week. As well as being chief guest at the lunch, Sir Walter also opened the exhibition.

Replying to the address of welcome given at the lunch by Mr. H. C. Wordsall, OCCA London section chairman, he said that since the war, 'we have been used to working our plants fully to 100 per cent capacity.' The salesman's task had been one of allocation rather than one of selling.

To-day all concerned with the state of trade wanted to know whether things would get better; how would the Americans handle their problems? How would falling off in US activity affect the UK? Although it was easier to be pessimistic than optimistic, too much pessimism could lead to an actual recession.

Sir Walter said that not only was the section celebrating its 10th exhibition, members were also celebrating the fact that the OCCA was itself formed 40 years ago. It was started with 27 members, last year the figure stood at 2,827.

Manpower Crisis

In his address of welcome, Mr. Wordsall referred to the current general shortage of scientists and technologists and declared that in this respect the oil and colour industry was going through a crisis. He felt there were two main reasons, financial reward and the question of status. Far too many companies in the industry did not have any technologists on their boards of directors. By the time of the 1963 exhibition, it was probable that there would be very few technical developments to be shown at the OCCA exhibition.

In 1955, the populations of UK universities had increased fourfold compared with pre-war. There should, therefore, be a better chance of securing graduate staff. That however was not the case. Many scientific staff showed a distinct preference for the fine chemicals trade, where, if they were keen to continue their degree studies, there were better facilities for pursuing chemistry than in an oil and colour laboratory.

Mr. Wordsall said the exhibition was launched to help spread knowledge based on scientific research work, from the suppliers to the using industries; that was still its object to-day. He thought that the technical standard set at the exhibition was very high.

The exhibition, sponsored by the London section of the Oil and Colour Chemists' Association, was held at the new Horticultural Hall, London SW1, for the third time. It was the largest ever.

Many of the new products were described in our special seven-page preview of the exhibition (see last week's CHEMICAL AGE) as were results of recent research work on the part of exhibitors.

The exhibition lunch, held just before the opening, was attended by 350 members and guests. Among the guests were Mr. C. W. A. Mundy, president, and Dr. L. A. Jordan, director, Research Association of British Paint, Colour and Varnish Manufacturers; Mr. H. V. Potter, president, British Plastics Federation, and Dr. V. G. W. Harrison, director, Printing, Packaging and Allied Trades' Research Association.

Pfizer's Extend Scholarship Scheme

EXTENSIONS to the scientific and technical scholarship scheme of Pfizer Ltd., Folkestone, Kent, have been announced by the company. In future about 20 candidates, as against about 10 previously, will be selected and will go to Canterbury Technical College to take advanced level GCE subjects. Each will receive a grant of £3 10s a week plus course and examination fees. At least half of these students will be selected annually for either university or sandwich courses.

A sandwich course will involve six months a year full time study and six months training at Pfizer's plant at Sandwich, Kent, for five years. A salary of £275 a year rising to £375 will be paid to successful candidates, plus the cost of textbooks.

University students will receive a grant of £420 a year. Pfizer have not made it a condition of entry that candidates will later join the company. Nor are the schemes restricted to local students.

Mr. P. V. Colebrook, production and research manager, said recently that more educational schemes of this type by large and medium-sized companies could help substantially to fill the gap between the country's need for scientists and technologists and its present ability to produce them.

New British Standards Published for Microchemical Apparatus

THREE further parts of BS 1482 'Microchemical apparatus,' and a revised edition of Part A1, 'Carbon and hydrogen combustion train (Pregl type)' which first appeared in 1950, have been published by the BSI.

*Part A*1. As a result of experience in the use of this apparatus and developments in technique, a silica combustion tube is specified in place of glass, an electric heater replaces the long gas burner, and simpler designs have been adopted for the pressure regulator, preheater, flowmeter and absorption tube. Because of the improved quality of rubber tubing new generally available, the conditioning and wax impregnation previously specified are no longer required, and chloroprene (synthetic) rubber tubing has been accepted as a suitable alternative to natural rubber tubing.

Specifications now published for the first time are Part F1, 'Filtration apparatus for microchemical purposes,' Part G2 'Vacuum drying ovens for microchemical purposes,' and Part K1 'Vaporimetric molecular weight determination apparatus.'

*Part F*1 specifies two sizes each of platinum, porcelain and silica filter crucibles, platinum filter-sticks and glass filter tubes; and one size each of porcelain, silica and glass filter-sticks. Requirements are specified for the material, weight and marking of these articles, and methods of test for constancy of weight are also included.

*Part G*2 specifies two types of glass vacuum drying oven. Type 1 oven is a horizontal tube surrounded by a jacket in which a suitable liquid is heated. This is convenient for drying hygroscopic substances contained in combustion boats and weighing tubes prior to a combustion analysis, or from drying substances in a current of inert gas. Type 2 oven has a vertical body which is closed by a cap with a ground flange and is heated in a liquid or oil bath. A metal tray holder is provided with interchangeable plates designed to accommodate the combustion boats, weighing bottles, crucibles, filter crucibles, filter-sticks and centrifuge tubes specified in other parts of BS 1428.

*Part K*1 specifies, with fully dimensioned drawings, the components for an apparatus for the vaporimetric microdetermination of molecular weights by the method described by Colson (*Analyst* 77, 1952, p. 139).

Copies of this BS may be obtained from British Standards Institution, sales branch, 2 Park Street, London W1, as follows: Part F1, price 4s 6d; Part G2, 4s; Part A1 (revised), 5s; Part K1, 4s.

Birmingham University's New Chemistry Block

The new chemistry block of Birmingham University, the first stage of which is expected to be completed in 1960, is to be named the Haworth Building in memory of the late Sir Norman Haworth, Mason professor and director of the department of chemistry from 1925 to 1948.

A FIRM'S annual dinner is usually a happy occasion. That was not the case, however, at the recent annual dinner and presentation of long service awards held at Luton by Fricker's Metal and Chemical Co. Ltd., for it was the company's last such event. Mr. M. I. Freeman, director of operations, made it clear that the Luton works were to be closed because of falling demand for the zinc oxide produced. He said that the decision to close had been 'agonising,' but it was not possible to keep running at half capacity.

The dinner should have been held last November, but was postponed when the possibility of closing the factory was first considered. The decision was taken only after very serious thought on the subject after zinc prices started to fall about a year ago. The company operate two works—that at Luton is to be put up for sale. After the shut-down the personnel manager is to visit Luton to investigate any cases of hardship.

Fricker's Metal and Chemical Co. are a subsidiary of the Imperial Smelting Corporation Ltd., and have their head office at 37 Dover Street, London W1.

IF A definitive textbook were to be written now on polymer science, only the first two chapters could be sketched out. That is the view of Dr. M. Gordon, assistant director of the Arthur D. Little Research Institute, Inveresk, who recently spoke to Manchester members of the Textile Institute of 'the very flamboyant claims that are currently voiced in the literature.'

The first chapters would cover the mechanism of polymerisation and depolymerisation reactions and thermodynamic properties of dilute solutions of polymers. Quite recently, however, interest has been focused on the bulk properties of polymers which might form the third chapter. Here, progress is mainly along three lines, each of which forms one of the main streams of academic thought in the physical sciences. They are based on statistical, static, and dynamic principles, as reflected respectively in molecular network theories, molecular packing theories and molecular relaxation theories.

THE HIGH esteem in which Professor F. H. Garner, head of the department of chemical engineering at Birmingham University, is held was evidenced on 6 March when the university council decided to extend his tenure of office until 1960.

Under ordinance Prof. Garner was due to retire at the end of the present session on reaching the age of 65 but the council has the power—which it rarely exercises—of extending the term of office. Prof. Garner is an alumnus of Birmingham University to which he returned in 1942 after a distinguished career in industry culminating in his appointment as European director of research for a leading petroleum firm. He is a past president of the Institute of Petroleum.

SURPRISE that Dundee with better port and rail facilities than Grangemouth, does not have more chemical plants was expressed by Dr. W. M. Cumming at a lecture he gave at Queen's College, Dundee, on 28 February. A former professor of applied chemistry and director for some years of the school of chemistry at the Royal Technical College, Dundee, Dr. Cumming added that Grangemouth was recognised as the centre of chemical engineering in Scotland.

Yet there were adequate facilities in Dundee for industrial expansion, particularly chemical engineering. Plants producing synthetic fibres for the textile trade could, for instance, be allied to the jute industry.

Doubtless the reasons are largely economic. Any company planning a large petrochemical plant, for example, would if looking for a site in Scotland presumably choose Grangemouth where feedstock is readily available. Depending on the product to be manufactured, other raw materials are also at hand and could be piped direct to a new plant.

The beginnings of what may eventually be a large new chemical complex is springing up in Northern Ireland, where Chemstrand, Du Pont and British Oxygen are building plants. Another vast project for ICI, is on the planning board for Severnside. It seems that Dundee will have to wait a long time before it gets even one chemical plant.

A REPORT from the US indicates that the Health Authorities have added methoxychlor, a chlorinated hydrocarbon insecticide, to the roll of chemicals which must be used with caution near dairy products. Even the smallest trace of methoxychlor in milk is forbidden.

The reason for the Health Authorities' concern is the effect on public health resulting from a continued intake of contaminated milk, butter and cheese. A short list of insecticides regarded as safe for application in milking sheds, dairies and processing plants includes pyrethrum and its synergist, piperonyl butoxide.

Synthetic insecticides can enter the body of a cow through the respiratory system (from contamination in the air) and by absorption through the skin when the insecticides are sprayed directly on to the animal. The 'poison' concentrates in the animal's fat and is released in the milk. Even residue of insecticides in feedstuffs have been known to cause tainted milk.

TOXIC chemicals used in agriculture and their possible effect on other forms of life are also the subject of concern in the UK. The River Tweed Commissioners at their recent annual meeting in Kelso spoke of the 'complete destruction' of fish in a tributary of the Tweed arising from the use of gammexane in a local greenhouse.

In their report, the commissioners point out that one part of gammexane in 30 million parts of water will kill all fish life and aquatic insects. One part of DDT in 10 million parts of water would have similar fatal effects. The report adds that one or other of these chemicals is present in most sheep dips, turnip fly dressings and other insecticides. In view of the fact that the Tweed is one of the country's finest fishing rivers, the commissioners understandably urge the farming community to use caution when disposing of wastes.

DOCTORS on both sides of the Atlantic got together on 6 March in a ceremony held jointly in the Connaught Rooms, London, and the Queen's Hotel, Montreal, Canada. The occasion was the award by Sir Clavering Fison of the 1957 Benger Prizes for original observations in general practice.

By means of a radio telephone link, both audiences were able to hear the papers presented by the three prize-winners, Dr. E. H. Evans, Rockingham, Nova Scotia (1st), Dr. J. F. Burdon, Paignton, Devon (2nd) and Dr. J. J. Hobbs, Ashington, Northumberland (3rd). Prizes awarded were £250, £150 and £100.

The prizes, given by Benger Laboratories Ltd., Holmes Chapel, Cheshire, were announced in November 1956. At the time, Mr. Basil D. Thornley, Benger managing director, said, 'The ideas or hunches we are looking for may be concerned with the causation, diagnosis, treatment or prevention of any disease. I believe that there are many doctors waiting for the opportunity to put their ideas, born of experience, at the service of humanity.'

The truth of this last statement was proved by the fact that nearly 100 doctors from all over the world, including one from Poland and one from Rumania, entered the competition.

The winning entries, adjudicated by the College of General Practitioners, together with abstracts of many other entries are being published by Benger in a booklet. Proceeds from the sale of the booklet will go to the College of General Practitioners for the benefit of general practice.

Alembic

HIGH EFFICIENCY FIBRE FILTERS FOR TAIL-GAS

Papers at I.Chem.E.'s Spring Meeting

FOUR papers were presented at the Spring meeting of the Institution of Chemical Engineers held at Church House, London SW1, on 4 March. The meeting was opened by the institution's president, Sir Hugh Beaver.

The first paper was presented by Professor D. M. Newitt (a past president of the institution) and Mr. J. M. Conway Jones, of the department of chemical engineering, Imperial College, London, which was entitled 'A contribution to the theory and practice of granulation'. The other papers were as follows: 'Physical rate processes in industrial fermation, Part 1: The interfacial area in gas liquid contacting with mechanical agitation' by Dr. P. H. Calderbank, Department of Scientific and Industrial Research, Chemical Research Laboratory, Teddington, Middlesex; 'The design of a simple mixer-settler: a method of design by calculation giving automatic interface control', by Mr. J. A. Williams, Mr. L. Lowes and Mr. M. C. Tanner, UK AEA Industrial Group, Research and Development Branch, Windscale Works, Sellafield, Calderbridge, Cumberland; and 'High efficiency fibre filters for the treatment of fine mists' by G. Lowrie Fairs, Imperial Chemical Industries Ltd., general chemicals division, research department, Widnes Laboratory, Lancashire.

RESEARCH work on the specific problem relating to the mist-effluent from a contact process sulphuric acid plant, from which the tail-gases pass through towers in which sodium carbonate solution circulates to absorb residual sulphur dioxide and to produce sodium bisulphite, led to an investigation of the efficiency of filter media. Mr. G. Lowrie Fairs in his paper 'High efficiency fibre filters* for the treatment of fine mists', describes these investigations.

Exit gases from the above-mentioned bisulphite section of the plant are stated to contain a very fine and persistent fume of sulphuric acid with a particle size of less than 2μ and 10 per cent by weight less than 1μ, the weight concentration of acid therein generally being between 0.036 and 0.18 gr. SO_3/cu. ft. The scrubbing efficiency necessary to ensure a clear exit was stated to be about 99 to 99.8 per cent.

Glass-fibre Filter

A glass-fibre filter was investigated. This was a special glass-wool with a 'fibre diameter distribution' between 30μ and 5μ, the majority being between 15μ and 5μ. The filter body employed consisted of a shallow cylindrical vessel with a conical top and bottom. The gas inlet was at the top and provision was made for the discharge of collected liquor from the bottom of the filter body. Provision was also made above the filter bed for washing *in situ* when necessary. The filter medium was supported as a horizontal pad 2 inches thick and maintained at a required packing density (7 to 10 lb./cu. ft.) by compression between either gauges or grids. Compression to more than 10 lb./cu. ft. was considered impracticable because of the strain upon supporting gauges. Gas samples withdrawn isokinetically from the gas main before or after the filter were bubbled through iodine/potassium iodide solution to absorb SO_2 before passing to the precipitator to avoid a falsely high figure for sulphuric acid in the corona discharge of the precipitation.

Using this glass wool filter the concentration of acid in the tail-gases at the exit of the filter was equivalent to 5.4 per cent and 2.5 per cent of the initial acidity passing to the filter calculated on an average of 0.1 g. SO_3/cu. ft.

To reduce liquor retention of the filter bed, it was decided to treat glass-wool with a silicone in order to provide a water-repellent surface. ICI silicone M.441 was used for this purpose. This consists essentially of dimethyl dichlorosilane, and contains in addition to its polysiloxane groups, some silicon-bound chlorine. This silicone is applied as a 2 per cent solution in inert solvent and the silicon-bound chlorine atoms are stated to react with hydroxyl groups on the surface of the glass forming a compound with the elimination of hydrochloric acid. Residual solvent is removed by drying.

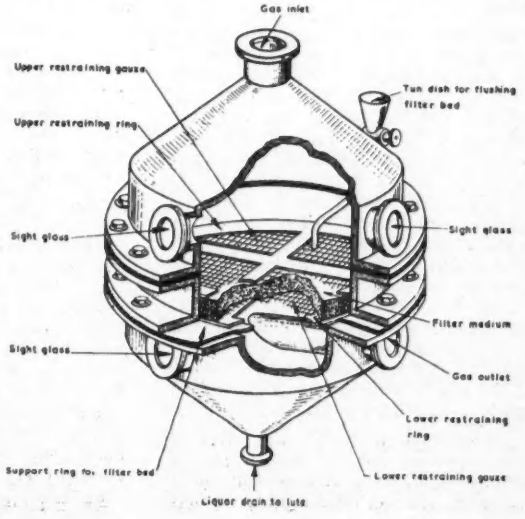
The 2 ft. 6 in. filter used in the previous experiments was packed with a 2 in. thick pad of the treated wool compressed to a density of 10 lb./cu. ft. It is recorded that when tested on the tail-gases from the contact bisulphite plant the filter showed a 'notable improvement in performance compared with the untreated fibres.' During a continuous run of 1,100 hours the acidity of the gases leaving the filter varied between 2.5×10^{-4} and 3.6×10^{-4} g. SO_3/cu. ft., equivalent to only 0.25 to 0.36 per cent of an inlet concentration of 0.1 g. SO_3/cu. ft. A faint fume became perceptible at about weekly intervals, but could always be eliminated by flushing the filter-bed with water.

It is suggested that slight carry-over from the bisulphite absorption towers gradually crystallises on the filter-medium and decreases its efficiency. The filter was found to deal competently with acid varying between 0.7 l./hr. of 2 per cent acid and 0.25 l./hr. of 13 per cent acid.

Attention has been given to the development of a preformed filter-mat which can be easily fabricated in any desired size and shape. Use has been made of Plant and Wallis's technique whereby the glass-wool is compressed to the desired packing-density in a sheet metal container and heated to 500°C for one hour. The stresses in the compressed fibres are relieved. The mats are heated with silicone after preforming.

Results of a trial using these preformed mats was summarised by Mr. Lowrie Fairs. Over the first 1,000 hours the trial was completed uneventfully. Acidity of the gases leaving was on the average 2.7×10^{-4} g. SO_3/cu. ft. and only once exceeded 3.6×10^{-4} g. SO_3/cu. ft. Washing of the filter-bed was carried out at about three-weekly intervals.

After 1,900 hours, the supporting gauze failed through corrosion. The filter performed satisfactorily for a further 1,000 hours after which the frequency of bed washing necessary to maintain a reasonable filtration-efficiency was greatly increased. Disturbance of the bed, it was suggested, might be due to crazing of the silicone film, this providing a surface upon which crystallisation of carry-over liquid from the



Arrangement of experimental large filter for mist-removal

**The high efficiency filters of the type described in this paper are the subject of patent applications in this country and elsewhere.*

absorption towers might more easily take place.

After 4,000 hours the mats were washed, dried and re-treated with silicone. Very high filtration-efficiencies had been obtained, Mr. Lowrie Fairs reported, since the resumption of the trial which had continued for 3,500 hours since re-treatment. Exit-acidities of the order of 1.8×10^{-4} g. SO_3/cu. ft. were obtained (only 0.2 per cent of the initial acidity). A life of at least 4,000 hours can be achieved and it is expected that a substantially longer life may be achieved in the future. Attention is drawn by the author of this paper to the successful re-treatment and re-use.

The possibility that garnetted Terylene fibre (a staple fibre carded to produce a filter medium) without a silicone film might be of value as a filter was investigated. A 2-inch bed of this material in loose form compressed to 10 lb./cu. ft. (89 per cent voidage) in a 3 ft. 6 in. filler body was tested on the tail-gas. Although its performance proved to be very good, it was not so outstanding as that of the silicone-treated glass-wool, the acidity of the gases leaving the filter being 3.6×10^{-4} g. SO_3/cu. ft. or 0.36 per cent of the average acidity of the plant tail-gas. The filter operated for about 3,100 hours without deterioration, the bed being washed at approximately monthly intervals to remove deposited crystals from the fibres. Mr. Lowrie Fairs suggested that garnetted Terylene might prove entirely adequate for duties less stringent than that imposed for tail-gas control.

Preliminary investigations have indicated which fibres were likely to prove highly efficient filter-media. Very high-efficiency filtration appeared to be associated only with fibres which collected the mist dropwise, while the formation of a continuous film of liquid on the fibre was an indication that the filtration-efficiency would be relatively poor.

It was pointed out that there were a number of duties where a silicone-film would certainly be attacked, e.g. in the presence of mineral acids in strengths in excess of 20 per cent. Garnetted Terylene, Mr. Lowrie Fairs considered, would probably prove adequate for many duties, by virtue of its advantage of much greater resistance to mineral acids and caustic alkalis. It was outstandingly resistant to hydrofluoric acid. Also as Terylene did not depend upon a surface film for its filtration efficiency its life should be indefinite.

Pre-formed filter media not only reduced possibilities of an unevenly packed bed, but speeded up the repacking of a filter. Also the pre-formed filter mats were already compressed to the required packing density and no restraint such as supporting gauzes or grids was required, thus reducing the risk of bed-failure due to stress corrosion of the supports in presence of acids.

Elucidating the Mechanism of Formation of Granules

THE object of the investigation by Professor D. M. Newitt and Mr. J. M. Conway-Jones was to elucidate the mechanism of formation of granules and to ascertain the factors which determined their texture, density and mechanical strength. The material used in these investigations, which were described in 'A contribution to the theory and practice of granulation', was silica sand of known particle size distribution, moistened with water. Granulation was carried out in a cylindrical drum rotating with its axis horizontal.

Preliminary experiments showed that the rate of growth of granules depended upon the moisture content of the feed-material, the speed of rotation of the drum, the drum-loading, and the average size and size-distribution of the feed-material. To demonstrate further the effect of moisture-content on the rate of granule-growth, experiments were carried out in which the granules were dried at various rates during granulation. Curves were obtained which showed that the effect of drying was progressively to reduce the rate of granule-growth and when the average moisture-content had been reduced to 62 per cent very little further growth occurred. A granule with a moisture-content above 62 per cent V (V = volume of dry solids) can coalesce with a smaller granule.

To demonstrate further the effect of moisture-content on the rate of granule growth, experiments were carried out in which the granules were dried at various rates during granulation. It was found that the effect of the drying was progressively to reduce the rate of granule-growth and when the average moisture-content was reduced to 62 per cent very little further growth occurred. At 55–45 per cent moisture-content, there was virtually no change in granule size.

The rate of growth for granules of fine sand varied with the loading of the granulator, a small load giving a low rate of growth. A practical limit was reached with a load of 6.5 lb. If expressed in terms of drum-revolutions, rate of granule-growth was found to be independent of the speeds below 23 r.p.m. A useful criterion, state the authors, is that tumbling material should not be carried above a line drawn horizontally through the drum axis and it would appear that, in general a speed of 120 ft./min. should not be exceeded.

Since the rate of granule-growth depended upon the ability of granules to deform and coalesce upon impact with one another, it was to be expected that finer materials, producing strong granules, would have a slower rate of growth. Experiments showed that the initial rate of granule-growth depended critically upon the moisture-content. Improvements in the production of small granules from the fine sand were obtained when a proportion of a much finer material, mixed fine-silt, is present. Very satisfactory small granules were produced in the moisture range 42–45 per cent.

An important property of a powder which indirectly affects its rate of granulation is the porosity or bulk-density to which it may easily be compacted. Optimum moisture-content for granules formed by rolling would be related, the authors indicated, to their density or porosity. It was found that vibration of the dry or wet material produced a reduction of porosity of about 20 per cent. Also granules of the uniformly-size sand underwent a little compaction after the first few minutes, but a considerable time was required for the mixed sands to attain a dense state.

In order that further conclusions might be drawn as to the mechanism of granulation, the forces giving rise to the cohesion of moist-sand particles were considered.

For regular systems of spherical packing the forces due to capillarity and surface tension may be calculated. From values of the cohesive stress corresponding to various degrees of saturation it was observed that the value of the cohesive stress rose steadily as moisture was removed, and it was inferred that a granule composed of rounded particles would exhibit some cohesive strength even though almost completely dry. For other particle shapes and configurations, such as cones (touching at their apices) and flat plates or spheres (separated by a finite distance), the increasing pressure-deficiency might not be sufficient to counteract the loss of moisture and the cohesive stress may fall to zero.

Removal of water by evaporation or otherwise from a granule containing moisture in the capillary state, it is stated, will set up a suction potential in the granule. This suction would increase rapidly as moisture was progressively removed until a value was reached known as the entry suction, when air began to enter the pore-spaces between successive layers of particles. Thereafter, the suction would remain almost constant until the pendular state was approached.

Spherical Particles

For spherical particles the value for entry suction is given by $P_e = x\,T/r$, where x is a dimensionless factor depending upon the type of packing (e.g. cubic $x = 4.8$ and rhombohedral $x = 6$).

As a first approximation cohesive stress may be written $f = s\,P$ where s is the degree of saturation of the voids and P is the suction developed in the pore liquid.

Measurement of granule strength was discussed by the professor and his co-workers. It was stated that it could be concluded that the strongest granules from a given material would be produced by compacting the particles to the minimum porosity with sufficient moisture to saturate the voids.

The effect of drying during granulation was to withdraw the capillary meniscii into the surface-waists of the granules and if the rate of drying was such that moisture was removed at the same rate as that at which compaction proceeds, the suction potential would remain fully generated. With this aid to the compaction process, it was stated, very much denser granules could be produced and the granule strength could be increased by as much as 25 per cent.

Assessment of entrapped air upon the strength of a granule was not easy, it was

stated, since no granules were found which were completely air-free; but on theoretical grounds it appeared likely that an air-free granule would be slightly stronger.

It was expected from the equation to show maximum strength

$$L.D^{-2} = k = 8.0\, k\frac{k_v}{k_a}\left(\frac{1-\epsilon}{\epsilon}\right) T\rho S$$

(L = granule breaking load; D = granule (least) diameter; k = granule strength factor ; = k_a = area particle shape factor; k_v = volumetric particle shape factor; T = surface tension; S = specific surface area (sq. cm./g.); ϵ = porosity and ρ = density of particles)

that granule strength would be directly proportional to the surface tension of the binding liquid and this prediction has been confirmed by the results of experiments in which aqueous solutions of alcohol were used instead of water.

The effect of mixed particle size on granule strength was investigated and it was found that for mixed particle sizes the strength of a granule could not be predicted at all accurately from the equation given above.

In a consideration of the mechanism of granule formation, it was reported that on all occasions when snow-balling occurred it was found that the 'lumps' had 2-4 per cent less moisture than the average in the granulator. An important method of reducing lump-formation was therefore to ensure even moisture-distribution in the charge. A relatively high moisture-content at this stage of the process was advantageous as it enabled the rapid formation of granules which could quickly break any large, loose aggregates before they cohere.

Granules themselves are not improved by high moisture-content, however, as this prevented their compaction. Improvements could be obtained by commencing with a high moisture-content, the excess water being removed during granulation by simultaneous drying.

Designing a Simple Mixer Settler by Williams, *et al*

IN their paper on the 'Design of a simple mixer settler: a method of design by calculation giving automatic interface control', Mr. J. A. Williams, Mr. L. Lowes and Mr. M. C. Tanner showed that satisfactory interface control in a simple mixer settler could be obtained without pumps or tilted boxes in a simplified form of the Standard Oil Co. contactor. Complete design had not been possible because of the lack of information on the properties of immiscible liquid mixtures.

A mixer settler transfers a solute from one liquid phase into another immiscible, or only partially miscible, liquid phase. It consists essentially of a chamber where the two liquids are mixed by stirring or some other means of agitation and a settler where the two liquids are separated by gravity. For counter-current flow in a number of stages, the units of settler and mixer are connected together. The two phases enter and leave at opposite ends of the system.

Such a system can be arranged in a box divided by partitions into separate mixers and settlers. Each stage consists of mixing and settling chambers, alternating so that these are always in juxtaposition. Liquids mixed in the mixing chamber pass together as an unstable emulsion to the settler through a port or slot placed about midway up the dividing wall. In the settler the phases disengage, the heavy phase passing on to the mixer of the next stage through a low-placed port, while the lighter liquid passes over an open weir to the next adjacent mixer in the opposite direction. The flow pattern represents co-current flow in each stage and counter-current flow overall.

Factors governing the position of the interfaces in the settlers can be automatically held within the limits defined during design except in the final settler (with respect to the heavy-phase flow). As the small pressure-drops occurring at the various transfer ports are not cumulative along the series, dimensions and locations of the ports are usually uniform throughout the system for any number of stages.

The mixed-phase port is sufficiently large to ensure that the pressure-drop between mixing and settling chamber is as small as is practicable at the designed throughput.

To prevent direct expulsion of the mixture by centrifugal action of the impeller, a vertical baffle plate may be placed in front of the mixed-phase port. The heavy-phase port can also be constructed with a baffle arrangement. The effective height of this port influences the level of the interface in the settler concerned and hence the relative hold-up time allowed for the heavy-phase. To ensure that the pressure drop is as small as possible, it may extend in the form of a slot across the whole width of the wall.

The light-phase port is best regarded as a simple open weir controlling the top level in each settler and may be constructed merely as a shortened wall with a knife-edge top extending across the chamber or a simple horizontal slot may be cut in the normal high wall.

In operation a difference in levels between mixers and settlers is established permitting all the upper-light phase levels in the settlers to be determined positively by the positions of the light-phase weirs; and overflow always occurs from settler downwards to mixer. The light-phase outflow from the end settler is similarly controlled by a weir of identical height.

Williams *et al.* discussing interface control by fixed weirs stated that a number of simplified assumptions were made in the first instance. It was shown that the pressure drop in a mixer settler of this type is not cumulative and interface levels are independent of feed densities and can be determined by fixing the positions of the aqueous-phase and mixed-phase ports. The assumptions were then examined.

Assumptions made were: (1) Mixing chambers give a uniform dispersion in the same phase ratio as the feeds; (2) Settlers are of adequate size to give complete phase separation; (3) Interface levels in the settlers are below the mixed-phase ports; (4) Only small changes in density occur from stage to stage; (5) Volume changes from stage to stage can be neglected; (6) Ports are designed of such dimensions as to give low pressure drops at the required flows.

The authors showed that using a modified MacMullen and Weber equation, P = I—exp (—Ft)/vf (where P = proportion of liquid, F = flow rate of phase under consideration, V = volume of the vessel and f = volume fraction of that phase) it was possible to design a mixer in which any desired proportion of either feed has a residence time not less than a chosen value.

The size of the aqueous-phase port could be calculated by assuming that it was a simple orifice or short pipe and the normal Bernouilli equation used.

To eliminate pressure the impeller should not be run at high speeds. It was preferable to exert suction on the port rather than pressure. The mixed-phase port could be designed in the same manner as the aqueous port if the properties of emulsions were known. Settler design was based on the principle that the emulsion wedge should not extend over the entire area of the interface so that changes in throughput could be reflected in changes in the wedge length. Experiments had shown that emulsion settling rates were a function of both the surface area of the emulsion and the volume it occupied.

Williams *et al.* noted that, in general, emulsions of aqueous phase in a continuous solvent medium did not settle at the same rate as emulsions of solvent dispersed in aqueous phase.

In conclusion, it was stated that it was possible to design a mixer settler with controlled interfaces by correct design of ports and settlers; that was, pressure drops at ports had to be at a minimum to preserve hydraulic independence of stages and settlers had to be large enough to hold the emulsion wedge under all reasonable variation in throughput. Of the factors which required further investigation, the most important was viscosity of emulsions and the mechanism of settling in liquid—liquid dispersions.

Frozen Valve Led to Chemical Worker's Death

DEATH of a process worker at the British Geon Ltd. works at Barry, Glam, on 24 January was stated at the recent inquest to be due to the freezing of a partly-exposed valve. When the valve froze it allowed impurities to flow into chlorine. In contact with acetylene, the impurities caused an explosion in which G. W. Harvey, aged 25, received fatal injuries.

Mr. D. A. Marsh-Smith, group plant manager, told the deputy coroner, that after a four-hour enquiry it was revealed that the safety devices gave an alarm which required emergency action. While the company relied on operatives to follow instructions, the technical and chemical knowledge needed to cope with the emergency was outside their scope.

A verdict of 'accidental death' was recorded.

Welding of 12 Stainless Steel Tanks for ICI

One of twelve stainless steel tanks which have recently been completed by the Birmingham and Blackburn Construction Co. for ICI plastics division. Welding equipment by Quasi-Arc was used to eliminate corrosion of the steelwork

TWELVE large diameter tanks have recently been constructed by the Birmingham and Blackburn Construction Co. Ltd. and supplied to the plastics division of ICI Ltd. for the storage of 'a corrosive liquid.' The first two tanks to be completed were constructed in mild steel with a lining of rubber. Contrary to expectation, however, the lining proved insufficient to arrest corrosion of the steelwork.

It was decided, therefore, to construct the main barrel of the remaining tanks in 18/8 stainless steel. All welding of these parts was carried out with Quasi-Arc Chromoid No. 2 electrodes, and was performed in position. The mild-steel reinforcements on the outside of the tank were welded on with Armoid No. 2 electrodes. The mild steel roof of the tank was lined with Prodorglas, a corrosion-resistant synthetic material produced by Prodorite Ltd., Wednesbury, Staffs.

It was agreed that it would be desirable, if possible, to retain the two original mild steel tanks in service, and therefore avoid the expense and loss of production which would have been caused by replacing them with stainless steel tanks. Both were lined with 18/8 stainless steel, a difficult operation, not only because the tanks had already been in use, but also because it is normally possible to obtain stainless steel sheets in standard sizes only, which impose a certain amount of inflexibility in the planning.

The procedure adopted was to weld 18/8 stainless steel butt straps horizontally round the inside of the tanks, using Armoid No. 2 electrodes. The straps were spaced at intervals of three feet. Mild steel packing pieces were then inserted between the butt straps. The plates were welded into position by the Argonarc process.

All 12 tanks are now providing satisfactory service.

Mass Spectrometry Discussed

MASS spectrometry techniques for the analysis of elements available as solids having very low vapour pressures were described by G. H. Palmer of the UK Atomic Energy Authority, Harwell, at a recent meeting on solid source mass spectrometry held by the Society for Analytical Chemistry. Mr. Palmer's subject was 'Solid source mass spectrometry —instrumentation'.

He compared furnace and thermal emission ion sources and described how the latter could be used in conjunction with a high sensitivity ion collector to analyse sub-microgramme quantities of material. The causes of error in the measurements were examined and methods for minimising these errors were described.

Mr. Palmer concluded by giving the main features of a modern instrument designed for rapid routine analysis.

'Solid analysis using a spark source mass spectrometer' was discussed by Mr. R. D. Craig of Metropolitan Vickers Electrical Ltd. An instrument designed according to the geometry of Mattauch for use with either photographic or electrical detection has been developed for the general analysis of solids. In favourable cases it was reported that impurities down to 0.01 p.p.m. could be detected.

Limits of detection of the order of 10^{-8} to 10^{-12} g. were claimed for the method of 'Stable isotope dilution analysis' described by R. K. Webster of the UK AEA, Harwell. The method was specific and freedom from interference problems was nearly complete. The main drawback was contamination either from reagents or from the atmosphere.

Oil Duty Repeal Plea

The Industrial Light Oils Committee sent a deputation to the Treasury on 3 March to press their claim for a repeal of the 2s 6d a gallon duty on light hydrocarbon oils used for industrial processes. The deputation was led by the chairman of the committee, Mr. N. J. Campbell.

Distillation Techniques Course at Loughborough

A SUMMER school on distillation techniques will be held at the department of chemical engineering, Loughborough College of Technology, on 15 to 24 July, covering the major design techniques in the field of distillation up to or beyond the level of the usual undergraduate honours course.

The syllabus will be: Part i, equilibria and thermodynamics, by Mr. H. K. Suttle and Professor S. R. M. Ellis; Part ii, stagewise calculations, by Dr. W. S. Norman and Mr. W. L. Brayley; and Part iii, plant design, by Dr. D. C. Freshwater, Dr. N. J. Hassett and Mr. W. F. Calus.

Tutorials on each subject will also be held and there will be opportunities for practical work in the laboratories. Fee for the course, including residence at a college hostel, is 30 guineas. Application forms may be obtained from the Registrar, Loughborough College of Technology, Loughborough, Leics.

Philips Awarded Kamerlingh Onnes Gold Medal

The Kamerlingh Onnes Gold Medal, a five-yearly award for scientific achievement, is to be presented this year to the Philips Research Laboratories, Eindhoven, Holland, for their researches into and development of the Philips gas refrigeration machine.

This is the first time since the award was instituted that it has gone to an institution rather than an individual, and the first time that Dutch science has been so honoured.

The Philips gas refrigerating machine (type PW.7000), which recently became available in this country, is a compact, single-cylinder unit, capable of producing five litres of liquid air or liquid nitrogen an hour, within 15 minutes of starting up. Its design is unique in that the gas to be liquefied does not undergo compression or pass through any working parts; in this way an exceptionally pure product is assured.

UK Oilmen Spent £22m. on Chemicals in 1957

Last year UK firms received orders for oil equipment and materials (excluding tankers) valued at £134,050,000. The total is the second highest ever recorded and compares with a record £153,730,000 spent in 1956. Some of the principal categories, with the value of orders placed in 1957, were: tubulars, pipe-fittings and valves, £23,051,000; chemicals, £22,209,000; specialised drilling and production equipment, £19,701,000; tools and machinery £11,312,000; and electrical equipment £8,455,000.

New Manchester Laboratories

Hardman and Holden Ltd., chemical manufacturers, Coleshill Street, Manchester 10, have had plans approved for the erection of a laboratory and offices at their works in Vickers Street, Miles Platting, Manchester.

EQUIPMENT REVIEW

Chemical Plant : Laboratory Apparatus Safety and Anti-Corrosion Products

PLASTICS FLOORING STRIP

A RANGE of coloured plastics flooring strip has just been introduced by Lorival Plastics of Little Lever, near Bolton, Lancs. Lorival have for some years been producing a popular range of black p.v.c. flooring strip—now their experience has been utilised in the development of this new range, which is manufactured in nine standard colours.

Produced in three basic shapes—H, L and T—the coloured flooring strip is manufactured in ten different sizes, supplies of which, in a colour, are immediately available. It can be formed at room temperature or by the application of a little heat. It is manufactured from high quality p.v.c. and is unaffected by cement and cold bitumen. The standard colour range includes black, white, yellow, red, brown, cream, and light and dark shades of green, blue and grey, and is supplied in standard lengths of 6 feet.

EXTRACTING IRON FROM PLASTICS

THE BSX type electromagnetic extractor has been specially developed for the extraction of finely abraded iron present in p.v.c. or other plastics, by Rapid Magnetic Machines Ltd., Lombard Street, Birmingham 12. It can also be used for the removal of fine particles from any other material in granular or powder form.

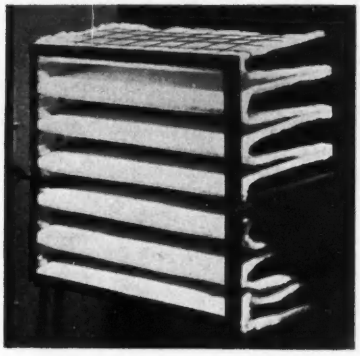
The material is fed into a hopper which incorporates an adjustable feed gate, and flows down a chute. Above this chute is suspended a stationary suspension magnet of super high intensity, fitted with two pole pieces suitably positioned across the feed to provide a field of deep penetration. The extractor is enclosed in a sheet steel housing. The iron contamination is attracted and held by the magnet pole shoes while the cleaned product passes forward to the next process.

Suitable vibrators can be fitted to both the feed hopper and the feed chute in cases where material is not free flowing. The Rapid BSX extractor is produced in several widths and a capacity of approximately 600 lbs. per hour is possible on a 3 in. wide model when handling p.v.c. granules. When correctly applied, efficiencies approaching 100 per cent are said to be feasible.

DRY AIR FILTER

A DRY-TYPE air filter with a throw-away filter material is about to be put onto the market by Visco Engineering Co. Ltd, Stafford Road, Croydon, Surrey. Each 'MV' filter comprises a frame and a removable cell. The cell has two sections which fit together to hold the filter pad between them. The two sections are fixed rigidly together for easy handling and the assembled frame rests on the sidecheeks of the frame, firmly clamped to a felt seating.

The throw away filter pads are made from a new fibrous material, and the fibres of the material are not dislodged by air movement. The raw edges of the pads are on the dirty side of the cell,



Dry filter with synthetic filter element

eliminating the possibility of fluff being picked off into the air stream.

The company state that the filter will give several hundred hours operation without changing the filter pads, but where heavy dust loads are encountered an oil-wetter filter of the same dimensions should be fitted as a secondary stage.

Over-all size of the MV dry-type air filter is 20 in. by 20 in., and capacity per unit is 750 c.f.m. with initial resistance of 0.125 in w.g. Initial resistance at 625 c.f.m. is 0.09 per cent w.g.

FINE GRINDING DISPERSION MILL

DEVELOPED from the 3 in. multipurpose mill, Premier Colloid Mills Ltd., Hersham Trading Estate, Walton-on-Thames, Surrey, have now introduced a 6 in. dispersion mill for fine grinding. The interior of the mill is constructed from polished sheet stainless steel and every contact surface is jacketed for cooling or heating. The rotor and stator are constructed from Carborundum stones, the drive is by laminated nylon and leather belt and the motor is a two-speed totally enclosed type providing 5 h.p. at slow speed and 10 h.p. at high speed. Flameproof motors are also available. Standard speeds of 2,000 and 4,000 r.p.m. are used and the size of the machine is 4 ft. by 1 ft. 6 in. by 5 ft. high.

When used for fine grinding, outputs in the order of 150/400 lb. an hour are obtainable at slow speed, while 500/1,000 lb. an hour are obtainable at high speed.

15 HP COMMINUTING MILL

THE Apex comminuting mill No. 170, a larger version of the mill No. 114, is being made by Apex Construction Ltd., Kent Road, Dartford.

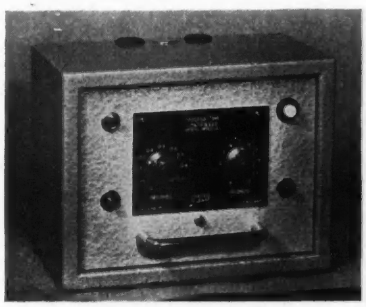
It is a 15 h.p. machine built for size reduction, granulation and intense mixing; the construction is in polished stainless steel and it is built for speeds up to 4,000 r.p.m.

A high output of 3,000 to 5,000 lb. per hour is claimed, and the screen size, speed of rotor and the type of blade can be varied with ease. The mill is fitted with a 6 in. power-driven screw feed. The machine has been designed for rapid dismantling without tools; the complete screw feeder mechanism being mounted on a movable plate operated by a handwheel at the rear of the machine. Screens can be changed or the grinding chamber removed in a few seconds.

ELECTRONIC TIME CONTROLLER

INTENDED for automatic time control of electrical circuits for laboratory and industrial processes, an electronic time controller is being marketed by Nagard Ltd., 18 Avenue Road, Belmont, Surrey.

Available in five ranges covering 11, 55 or 110 seconds and 5 or 10 minutes, each with 100 sub-divisions of time scale, either cyclical or sequential operation of two or more timers can be arranged. The timing interval is selected by two eleven-way switches, the settings being additive and derived from high stability components. The controller is immediately ready upon switching on and is started by a push button on the panel or by closing an external circuit where remote control or cyclical operation is required.



Automatic time controller

The start button duration of contact must be more than 0.015 seconds but no effect on the timing interval is caused by pressing it for a longer period or for a second time. The internal relay contacts can either make or break an external circuit and are rated at 5 amps. with a maximum potential difference of 400 volts.

NEW DRY POWDER BLOWER

A DRY powder blower now being marketed by Newton Chambers and Co. Ltd., Thorncliffe, near Sheffield, for use with their

Zaldecide insecticidal powders is said to be the only one of its kind in this country.

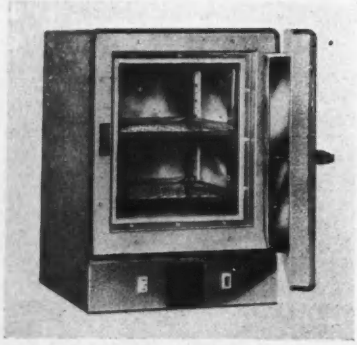
Intended for public health officials, horticulturists, and others concerned with disinfestation work in and out - of-doors, the blower is easily portable and simple in operation, with a minimum of labour required. When full it weighs 18 lb. and it will disseminate 7 lb. of insecticide powder in three minutes, to give a lethal coverage of from one-quarter to one acre according to conditions and requirements. Charging of the blower with powder is easily done, and it is pressurised up to 100 lb. per square inch in a matter of minutes by a foot pump. Price is £8 10s, supplied direct to the users.

Newton Chambers have two new insecticide powders for use in this dry blower—Zaldecide 'M' and Zaldecide 'D'. 'M' is for general use against all insects, both indoors and out-of-doors; 'D' is for the control of midges, mosquitoes, crickets, etc., by attacking the adult insects and their larvae with an insecticide having a long-term residual effect, and it is considered specially suitable for use under wet or damp conditions.

GALLENKAMP'S NEW HYDRAULIC THERMOSTAT

Featured in the new range of laboratory ovens made by A. Gallenkamp and Co. Ltd., Sun Street, London EC2, is the Compenstat, a new hydraulic thermostat devised specially to meet exacting requirements for accurate temperature control, together with automatic compensation for changes in ambient temperature.

The device consists of a sensing bulb connected by a capillary tube to bellows in the control head. These operate a snap-action micro-switch in the heater circuit. The snap-action prevents arcing and gives a contact life exceeding 300,000 operations, so that the thermostat setting is not upset by contact wear, and there is negligible interference with TV and radio. Extra sensitivity is achieved by a small auxiliary heater wound around the capillary tube in the control space and connected in series with the main heaters. The auxiliary heater shortens the cycle of operation, and this limits temperature fluctuation and overshoot.



Gallenkamp's new Compenstat

Automatic compensation for changes in control-head temperature (which is the best practical approximation to ambient temperature) is achieved by a separate bellows system.

The ovens, which meet the requirements of BS 2648, are available in three sizes, with or without mechanical convection. Temperature range is up to 200°C, reached from ambient within 65 minutes. Temperature variation between the middle and any other point of the working space does not exceed ± 2.5°C and fluctuation at any one point is within 0.25°C. The thermostat scale-plate on the control panel gives readings in °C.

Interiors, shelves and internal fittings are of stainless steel. Exteriors are finished with grey duotone enamel.

CADMIUM SULPHIDE CELLS

A new type of photo-electric cell which will, it is said, enable the cost of many industrial control and detection devices to be reduced substantially will shortly be available in quantity from Mullard Ltd. The new cell, incorporating a specially constructed photo-sensitive element of cadmium sulphide, has an extremely high sensitivity, which is stated as being some 20,000 times more sensitive than the conventional photo-emissive cell.

Even from weak sources of light it will produce sufficient current to operate a large relay direct, without the need for intermediate amplification. Electronic amplifier circuitry is therefore unnecessary. The cell will produce the current necessary to operate a relay with only a very low applied voltage. This is made possible by a special form of construction in which the resistance of the cadmium sulphide element is effectively reduced by an interdigital pattern of copper strips.

A comprehensive range of these cells will be marketed by the communications and industrial valve department of Mullard Ltd., Torrington Place, London WC1. Various types will be available for specific groups of applications. They will include cells of various power handling capabilities, with photo-cathodes ranging in area from a few square millimetres to several square centimetres. Sample quantities will begin to be available in March, and quantity production of the first type is scheduled to start in May.

CATHODIC PROTECTION FOR PIPELINES

When cathodic protection is applied to a pipeline it is essential for the line to be electrically continuous and if Viking-Johnson couplings, or similar electrically insulating couplings are used each joint must be bonded to give the necessary continuity. Mapel Ltd., Artillery Mansions, Victoria Street, London SW1, have now manufactured a bond in large quantities to give easy installation and the low resistance necessary to minimise current attenuation particularly in the case of impressed current schemes.

The Mapelbond is 1 in. x $\frac{1}{8}$ in. copper bar with tails for Mapelweld (thermit welding) to the pipe on each side of the joint, the centre portion of the wire being bonded into the sleeve, using either a thermit weld or a special connection in the top plug of the sleeve. The wire is also fitted in slots in the rings and the slots then peened over. The bond resistance can be easily controlled by modifying the section of copper bar according to the design of the cathodic protection scheme, the only limiting factor being the current carrying capacity of the copper wire, which in the case of large diameter lines could be increased to 7/064. This type of bond makes possible the use of impressed current to protect many miles of pipeline with one installation where previously the length of line to be protected was limited by the bond resistance. In addition, the company considers, this type of bond does not cause damage to the internal coating of steel pipelines.

Acalastic Linings for Chemical Processing

The resistant properties of reaction coatings to a wide range of chemical effects in food processing equipment are now being developed by Acalor (1948) Ltd., Kelvin Way, Crawley, in conjunction with their continental associates under the trade name Acalastic coatings.

The great advances that have been made in the toughness, acid and alkali resistance and applicability of these materials make it possible to treat a new range of equipment for both the chemical and the food processing industries, and their inertness to contamination is a further property. The advantages of applying coatings to form laminates of progressive resistance achieve the highest adhesion to metals, etc., toughness throughout the film and a highly resistant surface not fully obtained by coatings of this kind up to now.

The application of such linings to concrete in conjunction with other Acalastic renders makes this system of particular interest. Their application on site without contaminating odours or the necessity for high temperatures gives them an extensive range of use and, it is stated, a valuable addition to anti-corrosive lining construction.

Product Makes Cosmetics Formulation Easier

Formulation of anti-perspirants will be made easier, it is claimed, by the use of sodium aluminium chlorhydroxy lactate, now available from Albright and Wilson Ltd., 1 Knightsbridge Green, London SW1. It will not be necessary to incorporate buffers to avoid skin irritation and the rotting of fabrics and clothing.

Chief advantage claimed for sodium aluminium chlorhydroxy lactate is its compatibility with sodium stearate, making for quick and easy formulation of preparations such as cologne sticks. Other suggested applications are in the formulation of after-shave lotions and similar preparations.

STRUCTURE AND DRUG ACTIVITY—3

Influence of Chemical Groups in Anæsthetics

By
Peter Cooper
F.P.S., F.C.S.

ALL anaesthetic drugs exert a narcotic activity upon living cells, depressing their normal function. Clinical anaesthesia takes advantage of the fact that some drugs can reversibly depress nervous tissue without unduly depressing more robust body tissues, and in some way this seems to be connected with the high lipoid content of nerve cells. Narcotics apparently owe their action to two distinct aspects of the molecule—their ability to reach by physical means the site of action, and their interference there with an essential cellular function, presumably an enzyme system. As a general rule, therefore, anaesthetics, whether general or local in action, are liposoluble or possess a lipophilic component capable of dissociation. After this requirement is satisfied, they may take protean forms which defy close analysis. Clinically, any anaesthetic drug should be closely controllable during use, and should exert its desired effect in concentrations well below those which are known to be toxic.

Inhaled aliphatic hydrocarbons are reversible depressants. Methane itself is anaesthetic at concentrations only a little below toxic levels, but increased molecular weight enhances both narcotic power and toxicity, the first factor outstepping the second and becoming maximal with heptane. The corresponding unsaturated hydrocarbons, probably on account of their greater powers of penetration into nervous tissue, are more potent.

Undesirable Tendency

Olefine chains exceeding three carbon atoms tend to stimulate before they depress, which is clinically undesirable since it increases anaesthetic hazards indirectly due to the drug. Cycloalkanes increase in narcotic and toxic potency with higher molecular weight. Alkyl side-chains confer high toxicity, ethyl substituents proving more toxic than methyl. Cyclopropane and cyclobutane, were it not for their flammability and high expense, would be more widely used than they are, although both have a narrow margin of safety. Aromatic hydrocarbons are far too toxic to have any anaesthetic interest.

Halogenation of an aliphatic hydrocarbon markedly increases its anaesthetic potency and the greater the number of halogen atoms the more potent the drug—except in respect of fluorine componds. Chloro-compounds are much more active than bromo-, iodo- or fluoro-; their toxicity relates to the number of chlorine atoms and the molecular ratio of chlorine to carbon. Generally speaking, anaesthetic potency closely follows the trend of toxicity. Narcotic properties are retained even after the total substitution of hydrogen by chlorine, as in hexachloroethane.

The pattern of toxicity, however, is more intricate than these wide rules would suggest. Monochloroethane (ethyl chloride) and monochloromethane (methyl chloride) have been used in anaesthesia, but are irritant and too volatile. Ethyl bromide readily depresses respiration at anaesthetic levels, while methyl bromide and iodide are neurotoxic, and incidentally present a serious hazard in industry. Monochloro-monobromo-methane, however, is quite potent as an anaesthetic and comparatively mildly toxic. Among the unsaturated compounds, chloroethylene (vinyl chloride) is not very potent, and 3-chloropropylene (allyl chloride) is a violent irritant of mucous membranes.

Dichloro-hydrocarbons are narcotic but very toxic, and their narcotic powers sometimes appear inadvertently when they are employed as solvents. Trichloro-compounds offer a promising range of anaesthetic agents, for their toxicities are comparatively low while their narcotic powers are marked. Trichloromethane (chloroform) has been rather half-heartedly relinquished on account of its tendency to cause cardiac irregularities, since it is one of the most powerful inhalation-anaesthetics available, and trichloroethane has parallel activities. Trichloroethylene, which has a rapid onset of action, is less potent and less toxic than chloroform.

Introducing fluorine atoms into the chloroform structure progressively weakens both the potency and the toxicity of the drug. For example, trichlorofluoromethane is much less toxic than chloroform, and further replacement of chlorine by fluorine reduces the toxicity by about one-third with each step. The corresponding trichloroethane derivatives include one notable though expensive drug, halothane (2-bromo-2-chloro-1,1,1-trifluoroethane), twice as potent as chloroform. The replacement of all but one hydrogen atom in this drug renders it non-flammable, while the high fluorine content effectively reduces its toxicity. Tetra-halogenated compounds are powerful narcotics, but have marked toxic effects upon the liver; tetrachloroethylene is an exceptionally safe drug, used as an anthelmintic; its narcotic effects are not useful. All aromatic halogenated hydrocarbons are highly toxic substances, almost devoid of narcotic activity.

Hydroxylation of the hydrocarbons produces nervous depressants which are sometimes effective hypnotics but cannot be pressed to the point of anaesthesia. Tertiary alcohols are more narcotic than secondary, which in turn are more narcotic than primary. Ethanol, sometimes given intravenously, produces full anaesthesia only in concentrations which are dangerous to vital functions. Tertiary amyl alcohol has been used for hypnosis, but again is toxic in anaesthetic concentrations.

Halogenation increases the potency of alcohols. Only tribromoethanol (bromethol) has entered anaesthetic practice, and then only as a basal anaesthetic given by rectal infusion in high dilution; its effect is not easily controllable, and full doses cause serious respiratory and circulatory depression.

Other trihalogenated alcohols have been experimented with, and trichloroethanol is said to be less toxic than the bromo-compound. Nevertheless, there are scant prospects of success in this field of research. Aromatic alcohols when injected into tissue exert local anaesthesia. Phenylethanol is more effective than phenylmethanol (benzyl alcohol), though both compounds are approximately equitoxic.

Ethers, with the general structure R-O-R′, provide many excellent, though highly flammable and explosive, inhalation anaesthetics. Methyl n-propyl ether, isomeric with diethyl ether, is said to be a quarter more potent, and has a low toxicity. Dimethyl ether has an unpleasant odour, and its effects, though rapid in onset, are transient. Methyl ethyl ether does not appear to have been investigated. Ethyl n-propyl ether, like its lower homologue, is a safe and potent agent. With increase of molecular weight, narcosis and toxicity increase, but volatility is soon lost. As the series is ascended, so the safety margin between effective and toxic doses narrows. Ethers derived from dihydric and trihydric alcohols are not volatile enough to be useful.

Aliphatic Compounds

Unsaturated aliphatic compounds are more powerful than the saturated, but only divinyl and ethyl vinyl ethers are low enough in the toxicity scale. Isopropyl vinyl ether is relatively safe, and is said to have an anaesthetic index twice that of ordinary ether. The introduction of an alkyl group renders these very irritant. The cyclopropyl compounds have received a great deal of study; they tend to have a high potency, though there is some suspicion that some of them (e.g. cyclopropyl vinyl ether) cause functional liver damage.

As with the chlorinated compounds, toxicity and flammability may be lowered by the introduction of fluorine atoms. One such compound is 1,1,1-trifluoroethylvinyl ether, which is as potent as diethyl ether and of low toxicity. There may be surprises in store, however, for hexafluorodiethyl ether, far from being a depressant, is a powerful convulsant on inhalation, and has recently been employed in psychiatric shock therapy. Some of the aromatic ethers, particularly hydroxylated ones like eugenol, are mild surface anaesthetics. Local anaesthetic properties are combined with emetic ones in alphaguaiacylglyceryl ether.

Some barbiturate compounds can be used effectively as anaesthetics by the intravenous route. The requirements of such an anaesthetic are rapid action and comparatively mild potency. The sodium salts of thiobarbiturates are commonly used, hexobarbitone (5-(1-cyclohexenyl)-1,5-dimethyl

barbiturate) being the only notable exception. Thiopentone (5-ethyl-5-(1-methyl butyl)-2-thiobarbiturate) and thialbarbitone (5-allyl-5-(2-cyclohexenyl)-2-thiobarbiturate) are the commonly used compounds. It may be significant that the first and last of the three compounds above constitute exceptions to the two general requirements of barbiturate formulation—namely, that the groups at position 5 should total 4 to 8 carbons, and that each of these groups should have more than 2 carbon atoms.

One new intravenous anaesthetic, hydroxydione (21-hydroxypregnane-3,20-dione) is a solid steroid, without any of the undesirable side-effects associated with steroids in general. Further steroid compounds can no doubt be synthesised, but their introduction calls for new techniques of anaesthesia, and their time of induction is comparatively long.

Local anaesthetics affect the metabolism of nerve fibres, interfering with the intracellular oxidation of glucose, succinate and ascorbate. They are basic substances (usually used as water-soluble salts), more soluble in lipoids than in water. It is thought that a polar association between an amino-group and the lipoids in the cell membrane may be essential to their action. With few exceptions (though they are important ones in clinical practice) they consist of an aromatic residue joined to an amino-group by an intermediate chain. There is a lipophilic portion, usually a cyclic or heterocyclic hydrocarbon with a very variable number of substituted groups, an intermediate pivot which is often ester-like, and a hydrophilic group in the form of an amino-alcohol which confers a very limited water-solubility. If the hydrophilic group predominates, all anaesthetic activity disappears, while predominance of the lipophilic portion renders the compound so insoluble in water that it cannot reach its site of action, in sufficient concentration at least.

Alkaloids as Anaesthetics

The natural alkaloids, cocaine, yohimbine, papaverine, quinidine and others, offer a range of powerful local anaesthetics which are, however, unnecessarily complicated and toxic. The most successful synthetic compounds have been p-aminobenzoates, whose numbers are legion. The earlier esters, like ethyl and butyl p-aminobenzoates, enjoyed some vogue as surface applications until their unfortunate powers of sensitising patients came to the fore. The amino-alcohol esters, like procaine and its relations, have perpetuated this particular aspect of their toxicity—which is important for industrial handlers as well as patients. Acquired sensitivity to one amino-benzoate confers cross sensitivity to the others.

Halogenation of the aromatic nucleus lengthens the duration of action. Some of these derivatives, such as chloroprocaine (diethylaminoethyl-2-chloro-4-aminobenzoate), are less toxic than their parent. Hydroxylation of the nucleus produces more active variants, but alkylation of this hydroxylic group increases the toxicity; one such compound, ravocaine (2-diethylaminoethyl-4-aminopropoxylate), has been used clinically.

In this series of drugs the greatest anaesthetic potency (and incidentally sensitising power) accompanies an amino-group in the para position of the nucleus. Alkylation of this group increases both the potency and the toxicity, in the order methyl to butyl; higher alkyls reduce them again. Lignocaine (alpha-diethylamino-2, 6-acetoxylidide) breaks away from the series by having an amide linkage with the nucleus and no para substituent. Alkylation (dimethyl in this case) is necessary for clinical potency. Hexylcaine (1-cyclohexylamino-2-propylbenzoate) dispenses with the aromatic amine altogether. Both compounds, though rather more toxic than procaine, are more potent, and can be used in greater dilution; moreover, they are effective on mucous surfaces, which gives them a clinical advantage over procaine.

Several of the antihistaminic drugs, notably diphenhydramine (which might be included amongst the aromatic ethers), antazoline, promethazine and mepyramine, are incidentally powerful anaesthetics, though too toxic and liable to sensitise for any extended clinical use. This property in the antihistamines seems to depend upon the power of the drug to antagonise acetylcholine. In this connection a comparison may be made between the central structure of the conventional ester-linked anaesthetics and the corresponding chain in acetylcholine itself—

$$—N—(CH_2)_2—O—CO—$$

—which suggests that local anaesthetics may act by competing for receptors with acetylcholine.

New Applications for Tin Developed in 1957

ALL departments of the Tin Research Institute were active last year in pursuing new ideas and developing fresh applications of tin. This is stated in the Institute's annual report, 1957, just released.

Publication of a method of producing electroplated deposits of tin in a fully bright form was a notable achievement. The process is available without patent restrictions of any kind. The Institute's invention of bonding aluminium-tin bearing alloys to steel has now reached the commercial stage of development.

Production of titanium-tin alloys by powder-metallurgy methods is being investigated, with the aim of producing by this method sound titanium-tin and titanium-tin-aluminium alloys. A small experimental vacuum furnace has been used for sintering at high temperatures and low pressures. A preliminary investigation has shown that compacts of titanium and tin pounders pressed at room temperature could be sintered to give materials whose density approached that of the cast alloy. A more complete survey regarding pressing and sintering conditions has been undertaken.

Following the work on the synthesis of many new organotin compounds containing functionally active groups, starting from organotin hydrides, the fungicidal and insecticidal value of some of these has been assessed. A leading chemical company in Germany has marketed the first organotin fungicide for agricultural application under the name 'Brestan.'

Research is now under way at the TRI to find improved methods of analysis for organotin compounds. The polarography of di- and tri-alkyltin compounds has been investigated, using as supporting electrolyte both acid and neutral solutions containing *iso*propyl alcohol. Quantitative determinations have been made of single compounds and mixtures of di- and tri-compounds over a restricted range of concentrations. It has been found that solutions of dithizone in chloroform are capable of extracting both di-and tri-compounds quantitatively. The compounds are then determined by wet-ashing and determination of tin.

Work is in progress on photometric determination in the ultra-violet range. Diethyldithiocarbamate as a complexing agent is useful for the determination of single compounds. When analysing mixtures, a preliminary separation is necessary as the complexes formed with di- and tri-compounds show maximum absorption at about the same wavelength.

Corrosion studies at the Institute latterly have been concerned with the nature and structure of oxide films on tin and tinplate; both natural and artificially produced films are being investigated. The adhesion of lacquers to tinplate is also being studied.

Brief information is given in the report of the tin information centres overseas. Centre d'Information de l'Etain, Paris, France report that the preparation of French standards has been continued with the Association Française de Normalisation on the analysis of tin and impurities in tin ingots. French standards have been published giving photometric methods for the determination of arsenic, cadmium, tin, copper, iron, bismuth, nickel and aluminium. Preliminary work has been done for the preparation of a French standard for tin solders and fluxes.

Firm's Fifth BTP Contract for Sulphuric Acid Plant

A CONTRACT for their fifth sulphuric acid plant supplied to British Titan Products Co. Ltd., has been received by Chemical Construction (Great Britain) Ltd. The new contract is for a 250 tons per day contact sulphuric acid plant to be erected at Billingham. Planning permission for this plant was noted in CHEMICAL AGE, 1 March, p. 389.

The first plant supplied by Chemical Construction to BTP was a flash roaster installation with contact sulphuric acid section. The second was a contact plant to work on roaster gases and the third, ordered in November 1956, was started in January of this year. The fourth, a sulphur-burning contact sulphuric acid plant, is now under construction at Grimsby.

Overseas News

COLLINS LIQUEFIER USED IN ISRAEL FOR LIQUID HYDROGEN PRODUCTION

LIQUID hydrogen has been produced and used in Israel for the first time with the aid of an installation which is the only one of its kind in the Middle East. Production of liquid helium was officially announced about three months ago.

Production of liquid hydrogen and helium is carried out in the low temperatures laboratory attached to the planning research department in the Ministry of Defence. The Collins liquefier used for the production of the liquid hydrogen was acquired jointly by the Ministry of Defence, the Hebrew University and the Technion, Israel Institute of Technology, from the Arthur D. Little company in the US, and is the only one of its kind in the Middle East. The nearest equipment of this kind is in Italy and India.

The temperature of liquid hydrogen (−253°C) has been utilised in a number of experiments conducted in the microwave laboratory of the Hebrew University's department of experimental physics, headed by Dr. W. Low.

The first 14 litres of liquid hydrogen were taken to Jerusalem at the end of January. They were contained in special double dewars but even though the outer dewar contained liquid air (−80°C), about a litre a day was lost through evaporation. Dr. Low and his research group therefore had to work round the clock in order to conduct as many experiments as possible in the short time available.

Dr. Low is now setting up apparatus for experiments at liquid helium temperatures (−269°C) and hopes to conduct the first experiments within a month.

Grant to Rhodesian College

Lever Bros. (Rhodesia) Ltd. have given £10,000 to the University College of Rhodesia and Nyasaland to endow a research fellowship. It will be of the value of £650 a year and preference in its award will be given to male graduates who wish to pursue advanced study and research in chemistry, chemical engineering or allied subjects. There are no restrictions of race or colour for candidates who must normally be residents or children of residents in the Federation.

New Process for Recovery of Gallium Developed

A new process for recovering gallium, which will make possible the extraction of substantial quantities of gallium from ores has been developed by the Dow Chemical Co., Midland, Michigan, US.

The method consists of treating subdivided ore containing the metallic element with a current of hydrogen chloride or hydrogen bromide under substantially anhydrous conditions at temperatures ranging from 700 to 950°C. The current is utilised in an amount sufficient to volatilise gallium as the trihalide which is condensed and recovered as the pure material.

The chief characteristics of gallium are its long liquid range from 29.75°C to the boiling point of 1983°C and its low vapour pressure at elevated temperatures. The commercial potentialities of gallium have not been developed as yet but it has possible uses in the electronics field and as an amalgamating agent in place of mercury. US patent 2,823,096 covering the process was issued recently.

Du Pont Fluoride Plant for Mexico

E. I. du Pont de Nemours, US, are to invest a preliminary 125 million pesos (£3½ million) in a fluoride plant which may be installed at Monclova, Mexico.

Cyanamid Integrate Canadian Activities

North American Cyanamid Ltd. have changed their name to Cyanamid of Canada Ltd., and are to establish their headquarters in Montreal. Dr. L. P. Moore, recently elected president of the chemical company, said the changes were the result of pronounced trend towards integrated Canadian operations and increased production activity in Canada.

Cyanamid began manufacturing in Canada 50 years ago with a single product and over the years many facilities have been added to produce a wide range of chemicals. Cyanamid will look to Canada as a source of their future management in all possible phases of their Canadian activities. Regional sales offices will be maintained in Toronto, Montreal, and other large Canadian cities.

Pharmaceutical Plant Planned in Syria

The Syrian Ministry of Health is planning the construction of a factory for the manufacture of pharmaceutical products, notably penicillin, streptomycin and insulin.

Union Carbide's New Coagulant

A new organic flocculating agent, Polyox coagulant, has been introduced by Union Carbide Chemicals Co., division of Union Carbide Corporation and is now available in development quantities as white, crystalline granules. It is a high-molecular-weight grade of Carbide's new family of Polyox water-soluble resins, and the latest product in this unusual class of ethylene oxide polymers.

Polyox coagulant is stated to be rapidly adsorbed on many types of suspended solids to produce tough, stable flocs. As a result of the formation of these flocs, the settling and filtration rates of the solid particles are improved markedly. The flocculant is reported to be effective over a wide pH range in a number of systems, including uranium ore slimes, silica suspensions, coal washery and other carbonaceous slurries, and clay suspensions. It also shows ability to coagulate polymeric dispersions of organic materials such as many types of synthetic latices prepared by emulsion polymerisation for use in the manufacture of synthetic fibres and synthetic elastomers. Aqueous dispersions of natural latices can also be effectively coagulated with the new material.

Mexican Expansion of Pharmaceutical Capacity

Mexico hopes to be completely self-supporting for all local requirements of medical and pharmaceutical products by 1960. In 1940 Mexico produced only 45 per cent of these products consumed in the country; in 1950 the figure increased to 75 per cent and last year stood at 82 per cent.

Dominion Tar Acquisition

Dominion Tar and Chemical Co. Ltd. have 16.5 per cent of the outstanding stock of Gypsum, Lime and Alabastine (Canada) Ltd. Dominion Tar, one of the E. P. Taylor group are the largest distillers of coal tar and producers of its derivatives in Canada, and are one of the largest producers of salt.

Chilean Nitrate Output Up

During the first three quarters of 1957, production of Chilean nitrate, at 972,124 tons, showed an increase of 13 per cent over the same period of 1956. Production of iodine during the period January-September, 1957, was 938.8 tons, an increase of 110 per cent.

Italian Reserves of Uranium

According to Professor Felice Ippolito, secretary general of the Italian National Committee for Nuclear Research, the following reserves of uranium-bearing ore have so far been found in Italy. Alpi Marittime and Cozie Mountains: (a) certain: about 100,000 tons of mineral with 0.15 per cent content of U_3O_8, which would yield about 110 tons of metallic uranium; (b) probable: about 500,000 tons of mineral with average 0.15 per cent content of U_3O_8, which would yield about 550 tons of metallic uranium; (c) possible: 1,500,000 tons of mineral with average 0.15 per cent content of U_3O_8, which would yield about 1,650 tons of metallic uranium.

The prospectors engaged in this area are hoping to be able to supply final figures by the end of 1959 and think that it will be possible to ensure an output of 65 yearly tons of metallic uranium by 1960.

The other promising area is Val Gardena, where the following reserves are expected: (a) certain: 50,000 tons of mineral with the average 0.2 per cent content of U_3O_8, which would yield about 73 tons of metallic uranium; (b)

probable: one million tons of mineral with average 0.15 per cent content of U_3O_8, which would yield about 1,100 tons of metallic uranium; (c) possible: five million tons of mineral with average 0.1 per cent content of U_3O_8, which would yield about 7,500 tons of metallic uranium. In this area too, industrially plausible production is expected by 1960.

US Plastics Company Sets Up in Holland

US Polymeric Chemicals Inc., Stamford, Connecticut, has recently established a firm in Holland, Polymeric NV, Amsterdam, with an authorised capital of Fls. one million. The object of the new venture is to manufacture, process and trade in chemicals and plastics, paper and other products.

Oxidised Aluminium Cans for Mineral Waters

After three years of experiments, Boxal, a French aluminium company, have developed a can in oxidised aluminium which can be used for holding mineral waters such as those of the Evian Water Co. In the past, attempts to develop a metal container have been baulked by the difficulty of finding a material which would not make the water taste. The new cans, it is claimed, will result in a saving of 600 tons in freight per 1 million bottles of mineral waters exported.

Badische Anilin Report Higher Sales

A marked rise in consolidated sales is reported for the year 1957 by Badische Anilin- und Soda-Fabrik AG. These sales amounted to £153 million compared with £127 million in 1956. Exports rose more steeply than sales on the home market. Increase in volume was greater than the increase in value. Pressure is stated to continue on prices for the company's major products.

At the Ludwigshafen works new capital investment in 1957 totalled £19 million. It is announced that this year BASF will continue the same policy of capital investment as in previous years and further considerable expansion will take place. The new capital raised in 1957 gives resources which are still sufficient to cover these commitments. It is not intended to call on the capital market for further funds.

US Chemical Firm to Boost Exports to UK

A new division to make its products 'more available' in Britain and other European markets has been formed by American Cyanamid Co. whose 40 plants and 29,500 employees produce pharmaceuticals, organic and inorganic dyestuffs and pigments, biologicals and antibiotics, plastics and resins, insecticides, fumigants and other products.

Mr. Sidney C. Moody, vice-president for international relations and a director of the company, who has been appointed director general of Cyanamid International, stated in New York last week: 'By co-ordinating activities relating to our overseas business we shall henceforth be able to offer a wider range of technical assistance, products and processes in central locations in each country. We are looking forward to the opportunities this will give us to improve our varied services to the medical, agricultural, and industrial communities and to the consuming public.'

Consideration will be given, the director general reported, to the building of additional manufacturing plants in certain countries where market conditions and other factors appear favourable. Also in any such projects, the policy of placing operating responsibility, wherever feasible, in the hands of qualified citizens of the country in which the plant is located, will continue to be followed.

New Dacron Plant

Du Pont de Nemours and Co. are planning a new plant at Old Hickory, Tennessee, which may double the company's output of Dacron polyester fibre. The plant will have an annual capacity of 56 million lb. and will be completed by the middle of next year.

Inco Develop Nickel Electro-Refining Process

Development of a new process for electro-refining of nickel has been announced by International Nickel Company of Canada. The new method, developed after seven years' research, is claimed to be more efficient than the company's present practice.

Unlike the usual electro-refining methods in which a metal anode is used, this new process employs direct electrolysis of nickel matte and artificial sulphide. It eliminates high-temperature oxidation and reduction operations, with attendant losses of metals and sulphur and selenium. Thus nickel sulphide of low copper content from the Bessemer converter or other source can be cast directly into sulphide anodes and electrolysed for the production of high quality nickel.

The process is in commercial operation at Inco's Port Colborne, Ontario, nickel refinery. Sulphur-selenium separation takes place in a 100-foot-high fractionating column of special design.

Canadian and US patents are pending for this process.

Electric Reduction Expand Sodium Chlorate Capacity

Following talks with the parent company, Albright and Wilson Ltd., Electric Reduction Co. of Canada Ltd. are taking steps immediately to implement their long-range plans of expansion and diversification in the Canadian chemical industry. Expansion of sodium chlorate facilities in Eastern Canada will consist of more than doubling the capacity of the company's plant at Buckingham, Quebec. Construction has started and completion date is scheduled for July 1958. A 50 per cent expansion of Electric Reduction's sodium chlorate North Vancouver plant will be completed by the end of this month.

These expansions are designed to meet the requirements of the rapidly growing pulp and paper, uranium, and herbicide industries for the next five years, and to facilitate further expansion of capacity as required.

Australian Aluminium Plant

It was announced by the Queensland Mine's Minister last week that central Queensland will be the site of a £A145 million aluminium industry using Cape York bauxite. An agreement has been made between the Commonwealth Aluminium Corporation and Blair Athol Coal and Timber Ltd., and Blair Athol Open Cut Colleries Ltd. Consumption of coal eventually will be about two to three million tons a year.

Subsidiary Changes Name

The Canadian subsidiary of George Kent Ltd., Luton, Kent-Norlantic Ltd., has changed its name to George Kent (Canada) Ltd. Address for the offices and plant remaining unchanged at 389 Horner Avenue, Toronto 14.

New Polystyrene Dow Licence Unit in Australia

AUSTRALIAN industry is about to manufacture a new high impact polystyrene plastic as a result of close technical co-operation between US and Australian manufacturers, according to two plastics specialists from Sydney who have just completed a series of technical conferences at The Dow Chemical Co. in Midland, Michigan, US.

Mr. George L. Brunskill, plastics sales manager, and Mr. J. E. George Essery, plastics production superintendent, both of CSR Chemicals Pty. Ltd., report that the use of Dow's production and fabrication know-how will insure that the Australian product has the same quality which typifies Dow's high impact Styron.

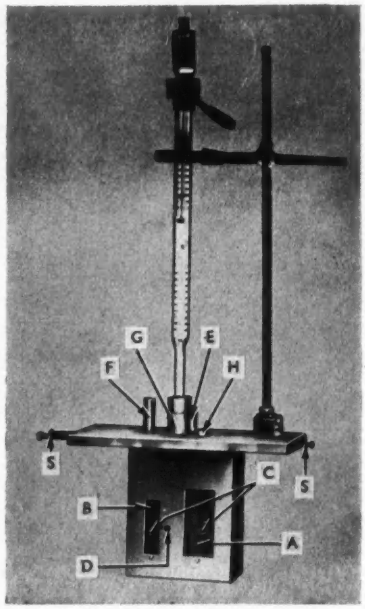
CSR Chemicals' new production facility, now under construction in Rhodes, NSW, will come on stream in May of this year. It is expected that the new material will become one of the most widely used in Australia and will follow the US pattern in the majority of its applications.

Under licence from Dow, CSR Chemicals is building the new plant in Rhodes. The licence arrangements were completed last year. Dow's technical know-how is being made available to the Australian operating staff through a visit to the US by Mr. Brunskill and Mr. Essery. They have studied Dow's production and fabrication techniques, quality control and customer service in Midland for six weeks. Dow engineers have assisted the Australian manufacturer in the engineering of the new plant.

The polystyrene unit in Rhodes will have a capacity sufficient to meet all Australian requirements. It is expected that this will give new impetus to the plastics injection moulding industry in Australia.

CELL CARRIER DEVISED FOR SPECTROPHOTOMETER

A CONSTANT temperature cell-holder for use with the Unicam SP600 spectrophotometer has been designed by Dr. A. Johnson of the textile chemistry department of the Manchester College of Science and Technology. He found that when following the rate of a chemical reaction by measuring the formation or removal of a coloured constituent, it is often convenient to be able to carry out the reaction in the spectrophotometer cell within the instrument. To do this, it is necessary to maintain the cell at a constant temperature, to provide some means of introducing the reaction solution and, on occasion, to maintain a particular atmosphere above the surface of the solution.



Cell-holder designed by Dr. Johnson

The cell holder was designed for measuring the rate of development of a dye on a cellulose film by means of acidic oxidising agents. For this reason, it was made to take a standard 10 mm. cell, so as to accommodate the cellulose sheet mounted on a glass frame, but obviously can be made to take any size of cell to suit the particular requirements.

The holder is shown above. The top has the same dimensions as the top of the conventional cell carriage and has a guide bar fixed at the back of its under-surface which runs in the grooves on the top of the instrument. There is no locating stud at the front of the under-surface, since the spacing of the cell compartments is not the same as that of the conventional basket. The main body of the carrier is a rectangular brass box 13 cm. by 10 cm. by 4.5 cm. soldered on to the top. In the front face are two recesses A and B, which just accommodate a standard 10 mm. cell together with the glass frame and a 10 mm. Unicam cell respectively. These two recesses could, of course, be made to take other sizes of cell. In the back face of each recess is a tube C, 6 mm. dia., running horizontally through to the back face of the carrier. A third tube D, running from the front to the back faces, allows measurements to be made against air. The centres of these tubes are 8.5 cm. below the under-surface of the lid and they can therefore be brought in line with the light beam through the instrument. Making the diameter of the tubes smaller than that of the light ports ensures that the tubes can be readily located with the tube fully covered by the light beam. The position of the carrier to bring A, B or D into the light beam is fixed by adjusting the locating screws, S, which butt against the ridge on the top of the instrument.

The carrier is maintained at a constant temperature by circulating water from an external thermostat bath. This water enters through the tube E, which runs down almost to the bottom of the carrier, and is returned to the bath via F. The wider tube G contains the regulator which controls the external thermostat, in this case a mercury contact thermometer controlling a Circotherm thermostat unit. With this arrangement, the temperature of the liquid in A could be controlled to better than $\pm$ 0.1°C at temperatures up to 80°C. The smaller tube H communicates with the recess A.

In use, an empty cell is placed in A and a comparison cell, if needed, in B, the carrier placed in the instrument and water circulated until the cells have attained constant temperature. At the same time, solutions of the reactants are reaching constant temperature in the external bath. The reactant solutions are then rapidly mixed and transferred to the cell in A by means of a pipette through H. The optical density of the solution in A can then be measured as required. Connecting a gas lead to H enables the reaction to be performed in atmospheres other than air; alternatively a small stirrer could be run through H if it is necessary to stir the reaction solution.

Semi-Automatic Handling of Glassware

BY THE use of machines designed and built within the company, Quickfit and Quartz Ltd. claim to have increased output of glassware from their Stone factory between four and six times.

The principal new machine installed has been for annealing. For some time intermediate annealing has been carried out by heated cowls dropped over and lifted off the glassware. Called the 'Top Hat', this principle has now been applied to the final annealing of heavy-wall ware which cannot be annealed continuously. Designed by Mr. Donald Curtis of Quickfit and Quartz in conjunction with the Midlands Electricity Board and Shelley Electric Furnaces Ltd., the 12-ft. by 6-ft. by 6-ft. 3-ton oven can be raised and lowered on a travelling hoist.

Most of the grinding at Stone is done on new semi-automatic machines also specially designed by the company's development department, although hand-grinding methods are still used for small runs. The machines are adaptable, and can receive many of the types of glassware made by Quickfit and Quartz. They are handled in batches of six and held by vacuum whilst being ground, the process being automatically timed. By this method the company claim that a very high standard of quality is obtained, with profile accuracies on conical joints to within one ten thousandth of an inch.

Installation of these new processes has been effected without any substantial reduction in the labour force. Higher output has enabled the company to exploit new markets, many of them overseas, and turnover has now reached £742,000.


Annealing machine is lowered over batch of industrial glassware

PEOPLE in the news

● MR. R. D. CAMERON, financial and commercial director of Joseph Crosfield and Sons, Ltd., Warrington, is resigning to join the personnel division of Unilever Ltd. He will be succeeded by MR. W. RIGBY, who is returning from Pakistan where he is chairman of the Sadib Vegetable Oils and Allied Industries Ltd.

● MR. JOHN CORBETT is resigning his appointment as a director of Edward Webb and Sons (Stourbridge) Ltd. on 31 March, to join the board of Eaglescliffe Chemical Co. Ltd.

● MR. R. H. MACNAB, head of the veterinary department of Smith, Kline and French Laboratories Ltd., Coldharbour Lane, London SE5, flew to the US on 7 March. He will attend the second symposium on nitrofurans to be held at the University of Georgia on 26, 27 and 28 March, and will study field trials of new products being developed to combat animal disease and discuss new veterinary products which could be made available in the UK.

● MR. H. P. LORD, A.F.C., B.Sc. (Eng.), A.M.C.T., has been appointed general sales manager of Sigmund Pumps Ltd., Team Valley, Gateshead 11.

● MR. D. C. LEE, B.Sc., F.R.I.C., has retired from the consulting practice of George Lewi and Partners in order to join Abbott Laboratories Ltd. The practice continues under the direction of MR. T. D. O'KEEFFE, M.A., who has been associated with it for five years.

● MR. L. O. CROCKETT has been elected president and chief executive officer of Goodrich Gulf Chemicals, US, in succession to MR. W. I. BURT, who becomes chairman of the board. Goodrich-Gulf Chemicals are jointly owned by BF Goodrich and Gulf Oil.

● MR. J. F. GARDNER, of 7 Newlands Avenue, Melton Park, Gosforth, Newcastle upon Tyne, has been appointed northern area representative for Refractory Mouldings and Castings Ltd., Kegworth, Derby.

● DR. A. H. COOK, F.R.S., has been appointed director of the Brewing Industry Research Foundation, Nutfield, Surrey, in succession to SIR IAN HEILBRON. Dr. Cook, who is 46, gained his Ph.D. at Imperial College, London. After a further period of study at Heidelburg he worked on dyestuff chemistry for Imperial Chemical Industries Ltd. In 1937 he joined the staff of Imperial College where with Sir Ian Heilbron he worked on the chemistry of penicillin. He became reader and assistant professor of organic chemistry at Imperial College in 1946. Since 1949 he has been assistant director of the Brewing Industry Research Foundation. Sir Ian Heilbron was appointed director of the research foundation in 1948 at the time when it was decided to start a central research station. He was responsible for choosing the present site and for adapting it as laboratories. Sir Ian was for 10 years professor of organic chemistry at Imperial College and a member of the advisory council of the Department of Scientific and Industrial Research, of which he became chairman in 1953.

Dr. A. H. Cook

● MR. J. KNOX, head of the industry division of the Department of Scientific and Industrial Research, has been appointed by the TUC General Council as a member of its scientific advisory committee. Other scientist members of the committee are MRS. W. RAPHAOL, National Institute of Industrial Psychology, MR. L. H. C. TIPPETT, Shirley Institute, and PROFESSOR D. M. NEWITT, Courtaulds professor of chemical engineering, Imperial College.

● DR. R. D. PEACOCK, PH.D., and DR. J. BURDON, PH.D., have been appointed lecturers in chemistry at Birmingham University. MR. T. R. BOTT, B.SC., has been appointed a lecturer in chemical engineering, and MR. D. I. REES, M.SC., has become J. Lyons research fellow in analytical chemistry.

● MR. TOM ROBERTS, chief metallurgist at the Brymbo Steelworks, Wrexham, has retired after 55 years in the steel industry. A fellow of the Institute of Metallurgists, a member of the American Society of Metallurgists and a former member of the Chemical Society, Mr. Roberts started as an ingot maker when he was 14 and later became a steam hammer driver. He studied at Wrexham Technical School and transferred to the metallurgical laboratory as an assistant, being appointed chief chemist and metallurgist in 1918. He is succeeded as chief metallurgist at Brymbo by MR. DENIS CAMPBELL.

● MR. HECTOR MCNEIL, deputy managing director of Babcock and Wilcox Ltd. since November 1953, has been appointed managing director. He succeeds SIR KENNETH HAGUE, who has held that position since January 1945. Sir Kenneth, who is also deputy chairman, will continue full-time with the company in that appointment.

● DR. H. W. KEENAN has been appointed a director of Reichhold Chemicals in place of MR. E. RABOUIN, who has resigned for health reasons. Dr. Keenan is a director of Beck Koller and Co. (England), Ltd., a subsidiary company.

● MR. M. H. M. ARNOLD has been appointed technical director of Bowmans Chemicals Ltd., Widnes.

● DR. J. MILLER, reader in physical organic chemistry, University of Western Australia, has been appointed to the chair of chemistry at Khartoum University.

Japanese Work on Effect of Gamma Radiations on Paints

RESULTS of experiments carried out to determine the effects of gamma radiations on various paints and other components have recently been reported by I. Terai of the Nippon Paint Co., Japan (US *Paint Oil and Chemical Review*, 1958, 23 January issue).

Materials investigated by Terai included boiled linseed oil, nitrocellulose lacquer, various kinds of synthetic resin enamels based on chlorinated rubber, vinyl chloride, an unsaturated polyester, an alkyd resin, etc. Pigmented and clear films were exposed to radioactive cobalt 60 at an intensity of 5.7×10^4 gamma per hour to a total of 1.7×10^7 gamma and the film properties before and after the exposure were compared.

The results indicated that least affected were the alkyd resin and the unsaturated polyester (as far as the tests went). Different results were found among the vinyl chloride series. Oil paints showed increased tackiness but were higher on scratch hardness and brittle on the drawing test with a good deal of flaking. Boiled linseed oil film became very tacky on irradiation and clear nitrocellulose turned very brittle. Pigmented nitrocellulose was brittle to begin with and showed no change.

As pigmentation appeared to make a considerable difference to the test results, a range of different pigments were examined in drying oil, chlorinated rubber and vinyl chloride. It was found however, that regardless of pigmentation, the paints all behaved as expected on the basis of the above experiments. Chlorinated rubber was the most noticeably affected by different pigments. White lead, barium sulphate and iron oxide were particularly affected. Organic pigments such as Hansa yellow and toluidine red, however, remained largely unchanged.

Obituary

MR. FREDERICK B. HOBSON, chief chemist with the Calder and Mersey Extract Co. Ltd., Liverpool, died recently at the age of 51.

Commercial News

Reichhold Profits Show Little Change, Dividend Maintained

GROUP profits of Reichhold Chemicals Ltd. for 1957 were little changed at £138,403 against £139,752 after providing £177,931 (£165,461) for tax. Parent net profit was £138,240 (£139,702).

An unchanged final ordinary dividend of 10 per cent, and a maintained bonus of 2½ per cent are announced, making 20 per cent for the year (same for 1956).

Borax Holdings

Trading profits of Borax (Holdings) Ltd. for the three months ending 31 December, after depreciation and depletion amounting to £371,678, were £45,575. Non-recurring profit was £58,688 and other income £58,460, including £21,510 profit on the sale of investments, making £162,723. Net profit for the period of Borax (Holdings) was £67,099.

In a quarterly statement, it is reported that the US operating company made a loss. Sales were 'not unsatisfactory', and the result was due to short-term factors. Start-up expenses on the new plants at Boron, California, were heavy, and it was necessary to continue borax operations at Wilmington, Ca, while the new Boron units were manned and started.

By end-December all borax production had been concentrated at Boron. Earnings should soon begin to reflect the resultant manpower and freight savings. The US management believes that earning power has only temporarily been reduced by the costs of the vast changeover in the operations of the borax division of the US subsidiary.

F. W. Hampshire

Manufacturing chemists F. W. Hampshire and Co. report a trading profit of £140,517 (£89,465). Investment income is £16,727 (£17,993) and surplus on revaluation of property £63,704 (nil). The sum of £17,054 (£16,625) has been set aside for depreciation.

A final dividend of 10 per cent (same) is declared, making a total of 10½ per cent for the year to 5 December 1957.

Jeyes' Sanitary

Group profits of Jeyes' Sanitary Compounds for 1957 rose from £180,028 to £200,123. Net profit, after taxation of £112,082 (£106,823), is £88,041 (£73,203). Revenue reserve receives £40,000 (£35,000) and carry forward is £36,245 (£33,441). Ordinary dividend is being maintained at 1s per 5s share with an unchanged final of 9d.

National Plastics

A group net loss of £24,119 (£77,399), all of which is dealt with in accounts of subsidiaries (£58,632), is shown by National Plastics. The consolidated balance-sheet shows shares in and amounts owing from associated companies of £242,058 (£29,693) and current assets of £1,036,872 (£1,027,738). Current liabilities are £731,887 (£557,012) including bank overdraft of £141,843 (£34,924).

Negretti and Zambra

Group net profit of Negretti and Zambra, scientific instrument manufacturers, for the year ended 30 September was £135,205 (£134,737) after tax of £126,750 (£132,976). Dividend of 15 per cent (same) is to be paid. Over the past 10 years turnover has risen by £1 million to just under £1,500,000 in 1957.

Titanine Ltd.

Profits of Titanine Ltd., manufacturers of aircraft finishes and cellulose and synthetic lacquers, for 1957, increased to £116,999 from £94,287, before deducting tax of £66,263 (£55,178). Dividend is raised to 27½ per cent from 25 per cent for 1956, allowing for the one-for-one capitalisation issue last April. The final payment is 17½ per cent (same equivalent).

Air Liquide

Air Liquide of France are seeking to increase their capital of Frs.4,643 million by Frs.10,000 million.

E. I. Du Pont

Net income for E. I. Du Pont de Nemours and Co., for 1957 was $396.61 million equal to $8.48 per share. This compared with $383.40 million and $8.20 in 1956.

NEW COMPANIES

CARTNER, DEEKS AND PARTNERS LTD. Cap. £5,000. Consultants and designers to the chemical, steel and heavy engineering industries and allied fields, etc. Directors: E. A. Cartner and L. R. Deeks. Reg. office: 177 Kenton Road, Harrow, Middlesex.

E. MCCORMACK AND CO. LTD. Cap. £30,000. To acquire the business of soap and chemical manufacturers carried on at West Pier, Dunlaoghaire, Co. Dublin, by Thomas W. Breaden. Subscribers: M. R. Clerkin and K. Corrigan.

MICHAEL UTTLEY LTD. Cap. £8,000. To acquire the business of chemical manufacturers and merchants carried on by Michael Uttley and Co. (Holdings) Ltd., under its former name of Michael Uttley and Co. Ltd., etc. Dir.: N. H. and B. Lee, D. E. and V. Uttley, and H. Kershaw. Reg. office: Red Lees Chemical Works, Littleborough, Lancs.

MEK CHEMICALS (PURCHASERS) LTD. Cap. £10,000. Manufacturers of and dealers in chemicals, gases, drugs, etc. Reg. office: Imperial Way, Balmoral Road, Watford.

NUTRIKEM LTD. Cap. £1,000. Manufacturers and suppliers of and dealers in chemicals, vitamins, oilcake, etc. Reg. office: Yorkshire Penny Bank Chambers, Harrogate.

PLASTOMER COATINGS LTD. Capital £2,000. Manufacturers of and dealers in synthetic coatings, glues, glue stocks, adhesives, waterproofings, etc. Directors: E. W. G. Wedge, A. R. Barlow, J. W. Cook and R. T. Hampson. Reg. office: 4-6 Browne Street, Liverpool, 20.

SIMONIZ PRODUCTS LTD. Registered February 21. Cap. £25,000. Objects: To buy, sell, manufacture, import, export and deal in waxes, polishes, and cleaning materials of all kinds, etc. Directors are to be appointed by Simoniz Company, Chicago, Illinois.

WEST AND SENIOR (SALES) LTD. Cap. £1,000. Merchants and manufacturers of paints, colours and chemicals for any trade, either for the home market or for export, etc. Directors: H. W. West, R. H. Senior, directors of West and Senior Ltd. Reg. office: Pendleton Mills, Croft Street, Pendleton, Salford, 6.

WOODFILL LTD. Cap. £1,000. Manufacturers of and dealers in wood filling and similar products, chemical and other substances for the preservation and treatment of timber and wood of all kinds. Directors: R. Baxter, V. G. H. Blake. Reg. office: 28 Mortimer Street, London W1.

CHANGES OF NAME

East London Saltpetre Works Ltd., 52 London Road, London SE1, have changed their name to Gramors Ltd.

Gramors Ltd., manufacturing chemists, etc., Neptune Works, Neptune Street, London SE16, have changed their name to East London Saltpetre Works Ltd.

LONDON GAZETTE

Voluntary Winding-Up

(A resolution for the voluntary winding-up of a company does not necessarily imply liabilities. Frequently it is for purposes of internal reconstruction and notice is purely formal.)

RUBBER INDUSTRIES AND SHERMAN CHEMICALS LTD. Members voluntary winding-up. Martin John Jackman, 3 Abchurch Yard, London EC4, appointed liquidator.

Appointment of Liquidators

C. BARBER LTD. (Chemical Engineers). Charles Samuel Garland, 47 Tabard Street, London SE1, appointed liquidator by the members.

Papers at IEA Forum

Papers to be presented at a forum to be held in conjunction with the 1958 Instruments, Electronics and Automation Exhibition (Olympia, 16 to 25 April) will include 'Thermonuclear developments, Sceptre 3', by Dr. S. Kaufman, AEI Ltd., research laboratory, Aldermaston. Other papers will include: 'Instruments in forensic science', by Mr. L. C. Nickolls, director of the scientific laboratory, New Scotland Yard; 'Computers — numerical automation', by Dr. A. D. Booth, director, computation laboratory, Birkbeck College; and a paper on 'Instrumentation in the petrochemical industry', by Mr. S. W. J. Wallis, British Petroleum Co. Ltd.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 3s. 3d. including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to Public inspection 16 April

Determination of the ash content of coal. Coal Industry (Patents) Ltd. **793 301**

Manufacture of cellulose acetate textile materials. British Celanese, Ltd. **793 527**

Adhesive bonding. B.B. Chemical Co., Ltd. **793 444**

Preparation of a α-4-chloro-2-methylphenoxybutyric acid and derivatives thereof. May & Baker, Ltd. **793 513**

Manufacture of polymeric materials. Imperial Chemical Industries, Ltd. **793 528**

Dyeing. Maifoss, Ltd. [Addition to 680 862.] **793 515**

Cracking hydrocarbons to produce lighter hydrocarbons and/or fuel gases. Metallges, AG. **793 517**

Stable petroleum distillate fuels. Standard Oil Co. **793 448**

Method of making sheet metal elements with expanded passages therein. Imperial Chemical Industries, Ltd., and Manning, I. **793 364**

Method of degasifying and gasifying pulverulent or finely granular fuels. Metallges, AG. **793 518**

Monoazo dyestuffs and process for making them. Ciba Ltd. **793 532**

Polyamide by copolymerising polyethers with certain polyamide-forming ingredients. Imperial Chemical Industries, Ltd. **793 451**

Detergent compositions. Weiss, W. **793 255**

Filtration process and apparatus. Fisons, Ltd. **793 540**

Ester mixtures. Farbenfabriken Bayer AG. **793 460**

Mixed ferro-magnetic ferrites. General Electric Co. **793 551**

Vulcanisation process for rubber. Imperial Chemical Industries, Ltd. **793 548**

Manufacture of photographic materials. Imperial Chemical Industries, Ltd. **793 554 793 570**

Preparation of macrocyclic lactones. Naamlooze Vennootschap Polak & Schwarz's Essence-Fabriken. **793 555**

Tetracycline preparations. Pfizer Corp. [Addition to 739 736.] **793 558**

Colouring textile materials. British Celanese, Ltd. **793 559**

Cyclic process for the utilisation of waste pickle liquors. Collin AG. [Addition to 791 057.] **793 560**

Organometallic compounds. National Lead Co. **793 354**

Apparatus for the gasification of finely divided solid fuels. Koppers Ges., H. **793 466**

Production of vitamin B-12 products. Pacific Yeast Products, Inc. **793 467**

Synthetic resin emulsion for impregnating laminating stock. Atlas Powder Co. **793 468**

Hygienic compositions. Warner-Lambert Pharmaceutical Co. [Addition to 771 768.] **793 379**

Fuel compositions. Distillers Co., Ltd. **793 563**

Manufacture of anthracenes. Imperial Chemical Industries, Ltd. **793 565**

Colouring process. Imperial Chemical Industries, Ltd. **793 566**

Preparation of α-2 : 4-dichlorophenoxybutyric acid and derivatives thereof. May & Baker, Ltd. [Divided out of 793 513.] **793 514**

Polyester and ethoxyline castings. Wayne Kerr Laboratories, Ltd., and Fletcher, K. A. **793 265**

Resinous condensation products. Rütgerswerke-AG. **793 574**

Polymers with ionising radiation. Esso Research & Engineering Co. **793 575**

Combustion apparatus. Soc. Anon. Generale Thermique-Procédés Brola. **793 325**

Filters. Birmingham Small Arms Co., Ltd. [Cognate application 35838.] **793 390**

Apparatus for indicating the weight of gas left in a compressed gas bottle. Etablissements Bretton. **793 272**

Preservation of food products. Kellie & Son Ltd., R. **793 580**

Rubbery copolymer-polar compound reaction. Esso Research & Engineering Co. **793 581**

Sustained release pharmaceutical preparations. Smith Kline & French Laboratories. **793 475**

Preparation of benzanthione. Imperial Chemical Industries, Ltd. **793 585**

Incorporating oil in butyl rubber. Esso Research & Engineering Co. **793 328**

Quaternary ammonium monoazo dye salts and their use. Geigy AG., J. R. **793 587**

Making polyglycol terephthalates and films made therefrom. Du Pont de Nemours & Co., E. I. **793 589**

Manufacture of phosphoric and thiophosphoric acid ester derivatives containing sulphoxide groups. Farbenfabriken Bayer AG. **793 279**

Activation of clay by acid treatment and calcination. Minerals & Chemicals Corp. of America. **793 393**

Copolymers of diallyl phthalate and of vinylidene chloride. Solvay & Cie. **793 481**

Preparation of leather. Farbenfabriken Bayer AG. [Addition to 756 175.] **793 603**

Stabilised solutions of acrylonitrile polymers. Chemstrand Corp. **793 482**

Smokeless powder. Olin Mathieson Chemical Corp. **793 398**

Grease compositions. Esso Research & Engineering Co. **793 484**

Method of coating aluminium and aluminium alloys with metals which are below aluminium in the electromotive series. Horizons, Inc. **793 485**

Purification of dinitroresorcinols. Imperial Chemical Industries, Ltd. **793 486**

Hydrogen-nitrogen gas mixture from coke oven gas and apparatus therefore. Stamicarbon N.V. **793 605**

Purification of materials. Telefunken Ges. **793 607**

Preparation of oil-soluble metal containing complexes. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **793 608**

Vulcanisation process for rubber. Imperial Chemical Industries, Ltd. [Divided out of 793 548.] **793 609**

Recovering basic antibiotics. Olin Mathieson Chemical Corp. **793 491**

Preparation of terephthalic acid. Henkel & Cie, Ges. **793 492**

Obtaining a substantially pure argon fraction from an oxygen- and nitrogen-containing stream such as air in which a small percentage of argon is present. Air Products, Inc. **793 336**

Asphalt composition for laminates. Esso Research & Engineering Co. **793 337**

Copper-containing trisazo dyestuffs. Farbenfabriken Bayer AG. **793 495**

Manufacture of globular powder. Olin Mathieson Chemical Corp. **793 404**

Manufacture of organic calcium sulphonate. Esso Research & Engineering Co. **793 610**

Polyvinyl acetate emulsions stabilised with hydroxyethyl cellulose. Shawinigan Chemicals, Ltd. **793 498**

Preparing phthalamic acid esters. California Research Corp. **793 405**

Steroids. Upjohn Co. **793 408**

Oil-in-water emulsions. Midland Silicones, Ltd. **793 501**

Production of alpha-chloroacrylic acid esters. Badische Anilin & Soda-Fabrik AG. **793 411**

Manufacture of glasses having one or more components. Zeiss-Stiftung, C., [trading as Janaer Glaswerk Schott & Gen]. **793 503**

Vulcanisable compositions. Midland Silicones, Ltd. **793 594**

Plasticised and heat and light stabilised polymeric compositions. Union Carbide Corp. **793 595**

Method of and apparatus for detecting breaks in nuclear reactor fuel rod sheaths. Atomic Energy of Canada, Ltd. **793 297**

Preparation of polyene aldehydes. Hoffmann-La Roche & Co., AG. **793 597**

Recovering monomers from polyamides. Inventa AG. Für Forschung Und Patentverwertung. **793 598**

Production of acetylene. Badische Anilin- & Soda-Fabrik AG. **793 599**

Non-toxic polyethylene compositions. Dow Chemical Co. **793 430**

Flameless reaction of gaseous hydrocarbons. Badische Anilin- & Soda-Fabrik AG. [Addition to 775 334.] **793 504**

Organo titanium compounds. National Lead Co. **793 355**

Ketones and a process for the manufacture thereof. Hoffmann-La Roche & Co. AG. **793 507**

Germanium diodes. Philips Electrical Industries, Ltd. **793 417**

N : N'-bis [(1-nitrocycloalkyl) methyl] alkylene diamines. Du Pont de Nemours & Co., E. I. **793 425**

Method of reducing the halogen content of halophenols. Abbey, A. (Dow Chemical Co.). **793 426**

Production of surface active agents. Mo Och Domsjö Aktiebolag. **793 427**

Process for the preparation of branched chain alcohols and hydrocarbons. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. **793 428**

Molybdenum - titanium - cobalt alloy. Climax Molybdenum Co. **793 429**

Open to public inspection 23 April

Process for the separation of certain components of coal tar. Coal Tar Research Assoc. **793 773**

Esters of drying oil acids with certain vinyl polymers. Imperial Chemical Industries, Ltd. **793 776**

Catalytic desulphurisation of petroleum hydrocarbons. British Petroleum Co., Ltd., Porter, F. W. B., and Housam, E. C. **793 943**

DIARY DATES

MONDAY 17 MARCH

RIC & SCI—Leeds: Chemistry Lecture Theatre, The University. 6.30 p.m. 'New developments in the chemistry of paints' by R. B. Richards.

TUESDAY 18 MARCH

I Chem E—Manchester: Reynolds Hall, College of Science and Technology. 7 p.m. 'Heat transfer in relation to nuclear engineering' by W. B. Hall.

WEDNESDAY 19 MARCH

Institute of Biology, Institute of Physics & RIC—London: William Beveridge Hall, Senate House WC1. 4.30 p.m. Symposium on science and society. Chairman, Prof. P. M. S. Blackett; speakers, Prof. L. Hogben, Prof. A. Haddow, Prof. Kathleen Lonsdale and L. F. J. Brimble.

I Chem E—Cardiff: University College. 7 p.m. 'Gas/solid reactions in fluidised beds' by Prof. E. S. Sellers.

RIC & SCI—Southampton: Civic Centre. 2.30 p.m. Symposium on radioactive isotopes.

SAC Microchemistry Group—London: The Feathers, Tudor Street EC4. 6.30 p.m. Discussion on 'The microdetermination of C, H and N in the presence of interfering elements (metals and non-metals)' opened by G. Ingram.

SAC Scottish Section—Edinburgh: Royal College of Science and Technology, The University. 7.15 p.m. Meeting on 'Developments in gas chromatography'.

THURSDAY 20 MARCH

CS, RIC & SCI—Edinburgh: Royal Society of Edinburgh, 24 George Street. 7.30 p.m. 'Some aspects of the chemistry of pharmacologically active substances' by Dr. E. S. Stern, Dr. R. G. Johnston and Dr. R. B. Barlow.

Fertiliser Society—London: Geological Society, Burlington House, Piccadilly W1. 2.30 p.m. 'Nitric acid' by Dr. D. A. Spratt.

Institute of Fuel—Loughborough: College of Technology. 7.15 p.m. 'Small pressurised water atomic power plants' by H. S. Prossor.

Polarographic Society—Birmingham: College of Technology. 10.30 a.m. 'Education in polarography'

SAC Midlands Section—Birmingham: Mason Theatre, The University, Edmund Street. 6.30 p.m. Discussion on 'The determination of toxic substances in the atmosphere' opened by Dr. J. C. Gage.

TRADE NOTES

Lang-London Ltd., centrifuge, mixer and emulsifier manufacturers, have extended their premises at 45 Hampstead Road, London NW1, where all their offices will be installed from 24 March.

Scottish Distributor

Silicone electrical insulating compounds, MS4, by Midland Silicones Ltd., are to be distributed in Scotland by R. D. Taylor and Co. Ltd., 9 Lynedock Street, Glasgow C2.

Platinum Prices

Prices in the free platinum market fell in London on 10 March. Refined platinum is now quoted at £24 to £24 10s per troy ounce, compared with £24 to £25 previously. The two leading UK refiners, Johnson Matthey and Baker Platinum are still selling at £26 15s.

New ICI Pigments

Two new pigments have been introduced by Imperial Chemical Industries Ltd., dyestuffs division. They are Monolite Yellow GTNS Powder for use in printing inks and Chromastral Green YS which has applications in alkyd media, industrial stoving media, nitrocellulose lacquers, printing inks, roller coating enamels, leathercloth, bookcloth and waxes.

Large Order for Midlands Firm

The condensing, feed-heating, distilling and de-aerating plants, together with boiler feed pumps and circulating pumps for the five 120 MW turbo-alternators for the new Buenos Aires Power Station will be manufactured by Worthington Simpson Ltd., Newark-on-Trent, Notts. They will also provide the circulating water pumps, screens and other equipment at the river intake. The complete contract for this station which is being built has been awarded jointly to the BT-H Export Co. Ltd. and International Combustion Co. Ltd.

W. M. Jessop's Titanium Offer

William Jessop and Sons announce that to enable engineers and designers to examine for themselves the properties of titanium in new projects, they are prepared to offer development supplies of Hylite titanium on specially attractive terms.

Monopolies Commission Asked To Consider Detergents

Among references still before the Monopolies Commission is that relating to the supply of certain chemical fertilisers. This is stated in the annual report by the Board of Trade on the Monopolies and Restrictive Practices Acts, 1948 and 1953. Among suggestions and requests made during 1957 to the Board for reference to the commission for investigations are the following: Anti-freeze solutions; bottled fuel gas for domestic purposes; carbon rods for primary batteries; soap powders and detergents.

Chemical Stocks & Shares

ENCOURAGING OUTLOOK

MARKETS over the last two weeks, after having had a modest amount of turnover, developed momentum towards the end of last week with the underlying tone being assisted by the possibility that the Government may adopt a more expansionist policy in the Spring. The rally on Wall Street and the proposed availability of funds entering the equity market from Manchester Corporation and London County Council also helped. The London market will for some time be watching their American counterpart very closely indeed; commodity prices seem to have grounded and look a little more healthy of late, and over the last week Wall Street prices have been slowly going up.

On this side of the Atlantic last week's gold and dollar reserve figures proved very promising and no doubt have helped our market to stage a moderate rally. Even so, in making hopeful assessments of the US scene, there is sufficient uncertainty to dictate caution to investors in chemical equity shares here but one must not rule out a gradual improvement of selected companies over this very difficult period.

1957/58 High	1957/58 Low		Mar. 11	Change on last 2 weeks
23/7½	16/4½	Albright & W. 5/-	16/10½	+1½d
11/6	10/6	Anchor 5/-	10/9	—
1/3	1/-	Ashe 1/-	1/1½	—
24/6	16/9	Bakelite 10/-	16/9	+3/-
7/10½	4/6	F. W. Berk 5/-	4/7½	-1½d
36/-	14/10½	Borax 5/- Dfd.	16/-	—
10/9	8/10½	Bt. Chrome 5/-	9/6	-3d
13/10½	10/3	Bt. Glues 4/-	10/6	-1½d
6/4½	4/9	BIP 2/-	5/3	+3d
8/6	5/6	Bt. Tar 2/6	7/10½	—
35/-	27/3	Bt. Xylonite	28/3	+3d
4/4½	3/6	Coalite 2/-	3/7½	+1½d
60/3	45/9	Fisons	48/3	+9d
9/6	7/6	Hardman & H. 5/-	7/9	+1½d
34/6	24/1½	Hickson & W. 10/-	32/-	—
46/6	36/1½	ICI	39/3	+2/6
4/9	2/6	Kleeman 1/-	3/-	-1½d
15/-	14/-	Laporte 5/-	14/10½	+10½d
22/-	13/9	Lawes 10/-	13/9	—
19/3	12/4½	Monsanto 5/-	13/1½	+1½d
15/6	11/-	Reichhold 5/-	12/6	+1/1½d
11/9	8/10½	Yorkshire Dye 5/-	8/9	-1½d

PUBLICATIONS RECEIVED

1:1 Pressure Transmitter (Diaphragm Type): For measuring pressure of liquids unsuitable for direct connection to a pressure gauge. Sunvic Controls Ltd., PO Box 1, Harlow, Essex.

Solder Paint: Epatam '3311': Perdeck Solder Products Ltd., Abbey Mills, Waltham Abbey, Essex.

This Was The Problem: Applications of Hidurax aluminium bronzes. Langley Alloys Ltd., Langley, Bucks.

Structures Laboratory: An account of methods and apparatus used by Aero Research Ltd., Duxford, Cambridge.

Visco Water Coolers: For industrial cooling. The Visco Engineering Co. Ltd., Stafford Road, Croydon, Surrey.

Service to Science: A series of leaflets on laboratory equipment. Townson and Mercer Ltd., Croydon, Surrey.

Spray Drying: Recent developments and explanation of basic principles. Kestner Evaporator and Engineering Co. Ltd., 5 Grosvenor Gardens, London SW1.

References to Scientific Literature on Fire: Part viii, 1954. Fire Research Station, Boreham Wood, Herts.

Metrohm Polarecord E261 and Metrohm Piston Burette E274: Metrohm Ltd., Herisau, Switzerland.

Synthetic Crystals: Addition to catalogue. Hilger and Watts Ltd., 98 St. Pancras Way, Camden Road, London NW1.

Tolerances for the Machining of Thermosetting Laminated Plastics: The British Plastics Federation, 47-48 Piccadilly, London W1.

Constant Differential Relay: For control of small flows. Sunvic Controls Ltd., PO Box 1, Harlow, Essex.

ICI Film Catalogue 1958: Imperial Chemical Industries Ltd., Imperial Chemical House, Millbank, London SW1.

Enchiridion: Progress report of stainless steel industry. Firth Vickers Stainless Steels Ltd., Sheffield.

Vehicle Body Building: Aero Research Ltd., Duxford, Cambridge.

ICI Silicones for Textile Finishing: Imperial Chemical Industries Ltd., Imperial Chemical House, Millbank, London SW1.

Welding Data Book: Eutectic Welding Alloys Co. Ltd., North Feltham Trading Estate, Faggs Road, Feltham, Middlesex.

Pitabond Lightning Adhesive: Caulking Services Ltd., 36 Great Queen Street, London WC2.

New Chemical Technology Facilities at Heriot-Watt College

New chemical technology facilities will be opened at the Heriot-Watt College, Edinburgh, on 3 July, by the Duke of Edinburgh. The new extensions in Chambers Street have cost some £500,000 and will provide a full chemical technology department with a series of physical and chemical laboratories, lecture halls, classrooms, drawing offices and other facilities. The new department will be linked to the chemical engineering department of the college.

Market Reports

New Business is on Limited Scale

LONDON Steady price conditions prevail in most sections of chemicals market, and no important changes have been reported. The movement to the home consuming industries has been fairly substantial in the aggregate, although this has been largely against existing contracts with strictly new business remaining on a limited scale. Despite competition from continental producers export trade has been keeping up to a good level, and a steady flow of fresh enquiry is in circulation.

Provided weather conditions do not further deteriorate, the seasonal demand for fertilisers should now be getting into full swing.

There has been no feature on the coal-tar products market. Quotations are unchanged and steady, and output is largely covered by forward contracts. Pitch continues in good request on home and export account.

MANCHESTER Traders on the Manchester chemical market have again reported a somewhat quieter demand from the textile and allied industries of Lancashire and the West Riding, but there is a steady demand from most other outlets for the soda and potash compounds, and for a wide range of miscellaneous chemicals against contracts. Shipping business in heavy chemicals seems to have been well maintained and a fair number of fresh export enquiries have been in circulation. Prices generally continue firm. The call for fertiliser materials is still showing a gradual expansion.

GLASGOW Although the market opened quietly conditions did improve, particularly towards the end of the week and overall showed an improvement on the previous week's trading. Deliveries against contracts are being reasonably maintained with those against current requirements being for the usual range of basic chemicals. The general price position remains fairly firm with little change.

Still quite a volume of enquiries are being received for the export market, which shows considerable interest.

Pye Catalogue for 1958

Included in the range of chemical instruments supplied by W. G. Pye and Co. Ltd., Granta Works, Newmarket Road, Cambridge, is a complete gas-liquid chromatography equipment in which the overall sensitivity is claimed to be very much higher than is normally achieved by using a katharometer as a detector.